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The Relationship between Quality Management and Competitive Advantage
An empirical study of the Egyptian hotel industry

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DEDICATION

This thesis is dedicated to the memory of my father Abdelhamed Mohamed Elshaer who died in August, 1998, and my PhD friend Abdelmonem Alsabt who died during my PhD journey.

ABSTRACT

According to the resource based view (RBV) of the firm, quality management (QM) is one of the sources the firm can use to generate competitive advantage (CA). Although QM and CA have widely attracted the attention of both academics and practitioners, the link between these two concepts has rarely been examined in the literature, especially in service industry. Additionally, among those few studies that investigated the relationship between QM and CA, there is contradictory evidence on which QM practices generate CA. Thus, this study examines the impact of QM on CA in the hotels industry, in order to identify which QM practices generate CA. Based on an extensive review of the literature on QM and CA, valid and reliable definitions were formulated for both concepts, and then a conceptual framework was developed to illustrate the relationships between the research variables. Data obtained from a survey of 384 four and five star hotels in Egypt is used to test the impact of QM on CA. A total of 300 responses were obtained. Twelve uncompleted questionnaires were removed, leaving 288 usable questionnaires and yielding a response rate of 75 %. All questionnaires were completed by the hotel general managers. Three main data analysis techniques were employed: exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and structural equation modelling (SEM). Three models are employed in CFA to test the dimensional structure of QM. These models include a model that allows all factors to be freely correlated (oblique factor model), a model where all factors are correlated because they all measure one higher order factor (higher order factor model), and a model where all indicators are employed to test if they measure only one construct. The results of CFA provide solid statistical evidence that affirm the multidimensionality of the QM construct and contradict other studies that employed QM as a unidimensional construct. These results assist in resolving the problems that might arise from the lack of clarity in the literature concerning the dimensional structure of QM. The SEM results affirm that the soft QM practices such as top management leadership (TML), employee management (EM), customer focus (CF), and

supplier management (SM) directly improve the hotel financial performance but the hard QM practices such as process management (PM) and quality data and reporting (QD&R) do not. However, two quality management practices, TML and SM, are found to distinguish those hotels that have CA from those hotels that have not. Therefore, these results can help hotel managers to reallocate the hotel resources to implement those QM practices that can improve the hotel financial performance and generate CA. Finally, this study would benefit if these models are tested with an alternative data set. This study also suffered from a limitation common to survey research and SEM. The current study survey, due to time and money constraints, is a cross sectional sample at one specific point in time. As a result, while causal relationships can be inferred, they cannot be strictly proven. Causal inferences are stronger with longitudinal studies.

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List of abbreviation

α: Coefficient alpha

AIC: Akaike information criterion

AMOS: Analysis of moment structures

ANOVA: Analysis of variance

AVE: Average variance extracted

B&O P: Business and operational performance

BP: Business performance

BR: Business results

BIC: Bayesian information criterion

C.R: Critical ratio

C: Core QMPS

CA: Competitive advantage

CF: Customers Focus

CFA: Confirmatory factor analysis

CFI: Comparative fit index

CITC: Corrected Item-Total correlations

CR: Composite (construct) reliability

DCS: Drop and collect survey

ECVI: Expected cross-validation index

E.Est.: Error variance estimates

EFA: Exploratory factor analysis

EM: Employee management

EP: Employee productivity

ES: Expected service

F&M P: Financial and marketing performance

FL: Standardised regression weights

FP: Ginancial performance

GDP: Gross domestic product

GFI: Goodness of fit index

GOF : Goodness-of-fit

I: Infrastructure QMPs

IP: Innovation performance

ISO: International Organization for Standardization

JIT: Just in time

KMO : KaiserMeyer- Olkin

LE: Livre égyptienne (French for Egyptian pound)

M: Mean

ML: Maximum likelihood

NFI: Normed Fit Index

OP: Operational performance

P: Probability value (significant level)

PCA: Principal component analysis

PCFI: Parsimony comparative Fit Index

PhD: Doctor of Philosophy

PI: Product innovation

PM: Process Management

PNFI: Parsimony normed fit index

PQ: Product quality

PS : Perceived service

QD&R: Quality Data and Reporting

QM: Quality management

QMPs: Quality management practices

QO: Quality outcomes

QP: Quality performance

R&D: Research and development

r: Correlation coefficients

R^2 : Squared factor loading

RBV: Resource based view

REV/room: Revenue per room

RMR: Root Mean square residual

RMSEA: Root mean square error of approximation

ROA: Return on assets

ROE: Returns on equity

ROI: Return on investment

S.D: Standard deviation

S.E: Standard error

S: Actual observed covariance matrix

SEM: Structural equation modelling

SM: Supplier Management

SPSS: Statistical Package for Social Sciences

SRMR: Standardized root mean square residual

TLI: Tucker lewis index

TMC: Top management commitment

TML: Top management leadership

TQM: Total quality management

U.Est: Un-standardized regression weight

UK: United Kingdom

USA: United States of America

VIF: Variance inflation factor

$\chi 2$: Chi-square

$\sum k$: Estimated covariance matrix

Chapter 1: Introduction

This introduction provides an insight into the research area and the reasons why this research deserves to be conducted. The following section deals with the research problem, research aim, objectives and contribution. This is followed by a summary of the literature review, a discussion of the methods employed for conducting the current study, and the limitations of this study.

1.1 Research Problem

Organizations seek to gain more market share and increase their profitability through adopting a strategic approach that gives the firm a competitive advantage (CA) over its rivals (Porter, 1980, 1985; Wernerfelt, 1984; and Barney, 1986, 1991). There are two main theoretical approaches that can be used to achieve competitive advantage: the resource based view (RBV) of a firm and the market-based approach. Both approaches introduce several sources to generate CA. The resource based view is driven by resources that are internal to the firm (Wernerfelt, 1984; Barney, 1986, 1991, 2001, 2007), and according to Barney (1986) should fulfil the following criteria to be a source of competitive advantage: valuable; rare; inimitable; and non-substitutable (VRIN). These sources might be tangible or intangible resources (Barney, 1991).

Intangible resources are the skills or the distinctive capabilities of the firm key personnel that could set the firm apart from its competitors. These may include all items not appearing in the material reports (balance sheets) such as reputation, brand equity, and quality management (Day and Wensley ,1988; Carmeli and Tishler, 2004; Zhi-yu, et al., 2006; Abu Bakar, 2009). Tangible resources might be the possession of raw materials, long-term supply contracts, low cost manufacturing and distribution systems, production capacity, financial structure and access to capital (Day and Wensley, 1988, Zhi-yu, 2006). Both superior skills and tangible resources represent the ability of a business to do more or do it better (or both) than competitors (Day and Wensley 1988, Carmeli and Tishler, 2004). In the same vein, in any competitive market it has been argued that firm intangible distinctive capabilities are more likely to create a competitive advantage because they often are truly rare and can be more difficult for competitors to imitate (Black and Boal, 1994; Itami, 1987; Rao, 1994). Among firm intangible capabilities, effective quality management (that enhances the business performance) is one of the most important, and significant sources of competitive advantage that is difficult to imitate (Zhi-yu et al., 2006).

In contrast to the RBV approach of CA, the market based approach of CA (first coined by Porter, 1980 who introduced three generic competitive strategies to achieve CA) is mainly driven by external factors (Reed et al., 2000). Porter (1980, 1985, 1991, 1996) claimed that firm competitive strategy (cost leadership, differentiation or focus) aims to achieve competitive advantage through establishing a profitable and sustainable position against the five forces (threats of new entrance, threats of substitute product or service, bargaining power of buyers, bargaining power of supplier, and rivalry among existing competitors) that determine the industry competition and profitability. In a cost leadership strategy, the main target of the firm is to be the low-cost producer in an industry, while in a differentiation strategy the firm aims to be unique along some sources that are broadly valued by buyers. Differentiation can be based on marketing, the product (service) itself, delivery system, quality, and a broad range of other factors. In a focus strategy, the firm tries to implement one of the generic two strategies (cost leadership or differentiation) or both in specific target segments (Porter, 1996).

Despite the apparent contradiction between the above mentioned two approaches of CA, where the RBV focuses on internal resources while the market based view is driven by external factors, they can complement each other at least in one sense: that is in the role of QM. Indeed, literature review supports that quality management, as a distinctive capability can generate CA (according to the RBV), while it can also be employed to enhance product quality, which is seen as an aspect of Porter's (1985) differentiation strategy (Dow et al., 1999; Ahire and O'Shaughnessy, 1998; Prajgo and Brownl, 2004; Prajogo and Sohal, 2006; Tarı´et al., 2007 Su et al., 2008; Lakhal, 2009). In both approaches, quality management contributes therefore to enhancing the business performance and generating CA (Flynn et al., 1995; Douglas and Judge, 2001; Kaynak, 2003; Zu et al., 2008).

Despite the important theoretical role of quality management in improving business performance and achieving competitive advantage, as previously explained, few empirical studies have investigated this relationship (see Table 1.1). More specifically, for more understanding of the gaps in the current study research area, a search in some social sciences databases was conducted. Table 1.1 shows some gaps in the quality management and business performance/competitive advantage literature, which represent issues for research.

Table 1-1 Summary of Literature Research

Key words / Data base	QM	QM & performance	QM and CA	QM & CA in hotel industry	QM & CA in hotel industry in Egypt
ABI/INFORM Global -Scholarly Journals. -Dissertations	 2503 87	 176 6	 10 0	 0 0	 0 0
Science direct (all sources)	1260	44	2	0	0
Business Resource Premium (Academic Journals)	1738	104	9	0	0
Academic Research Elite (All resources)	828	19	2	0	0
Total	**6416**	349	23	0	0

Date: started 2008 and modified February 2012.

According to Table 1.1, Firstly, there is a shortage of studies that link quality management to competitive advantage (the percentage is 0.16% at ABI/Inform (10/6416*100), 0.03% (2/6416*100) at Science Direct, 0.14% (9/6416*100) at Business Resource Premium and

0.03% (2/6416*100) at Academic Research Elite). Secondly, among studies that investigated the relationship between quality management and competitive advantage there is an absence of studies that investigated this relationship in hotel industry (the percentage of studies are: 0.0% at ABI/Inform, 0.0% at Science Direct, 0.0% at Business Resource Premium and 0.0% at Academic Research Elite). Therefore, there are few studies that investigated the relationship between quality management and business performance and in particular that investigated the relationship between quality management and competitive advantage (see Appendix 5). In conclusion, the results of searching in the above databases clearly show the existence of research gaps.

Additionally, several empirical studies such as those conducted by Samson and Terziovski (1999); Dow et al. (1999); Kaynak (2003); Merino-Diaz (2003); Sila and Ebraimpour (2005) ; Lakhal et al. (2009); Tari et al. (2007); Su et al. (2008); and Zu et al. (2008) extensively investigated quality management as one of the most inimitable sources the firm can use to improve its performance and achieve competitive advantage over its rivals (see Section 2.2). However, there is contradiction in the literature concerning (1) the dimensional structure of quality management and (2) the specific quality management practices that generate superior outcomes such as competitive advantage, quality performance, financial performance, customer satisfaction, and overall business performance. Both reasons of that contradiction are briefly illustrated below (For more details, see Appendices 4 and 5).

First, some empirical studies such as those conducted by Easton and Jarrell (1998), and Rao et al. (1999), assumed that QM is a uni-dimensional construct. Thus QM is simply not investigated empirically in terms of individual practices but assumed to be a single construct with no practice specified. Others, such as Douglas and Judge (2001); Prajogo and Sohal (2006); and Su et al. (2008) identified several dimensions of the QM construct and then a single composite score of QM was used in the data analysis. Still others, such as Barker and Emery (2006); Kaynak and Hartley (2005); and Terziovski (2006) concluded that QM is a uni-dimensional construct because the individual dimensions of QM were found to be unable to enhance the business performance (see Appendix 4).

In contrast, other scholars such as Saraph et al. (1989); Conca et al. (2004) ; De Cerio (2003) ; Mady (2008); Flynn, et al. (1994); and Zu et al. (2008) assumed that QM is a multidimensional construct . They predetermined several dimensions of QM and conducted exploratory factor analysis (EFA) for each single practice (dimension) of QM to test its uni-dimensionality. However the factorial structure of the QM construct itself was left statistically untested. Others, such as Ahire et al. (1996); and Dow et al. (1999) assumed that QM is a multidimensional construct and used the EFA technique to discover the factorial structure of the QM (See Appendix 4).

Second, there is a lack of clarity in the previous studies regarding the nature and the direction of the relationship between QM and competitive advantage. More specifically some empirical studies such as those conducted by Saraph and Schroeder (1989); Flynn et al. (1994); Douglas and Judge (2001); Prajgo and Brown (2004); Barker and Emery (2006); Prajogo and Sohal (2006); Terziovski (2006) and Su et al. (2008) concluded that QM, if only employed as a uni-dimensional construct, generates superior outcomes (including quality performance, financial performance, and competitive advantage). In other words, only the combined set of specific quality management practices which differ from one author to another when implemented simultaneously can generate superior outcomes (Terziovski, 2006).

Several empirical studies such as those conducted by Powell (1995); Dow et al. (1999); Samson and Terziovski (1999); Rahman and Bullock (2005); Lakhal (2009); and Tari et al. (2007) contradicted the unidimensionality view of the QM construct and concluded that the uni-dimensional view of the QM is invalid, and QM as a multi-dimensional construct generates superior outcomes (including quality performance, financial performance, and competitive advantage). In other words, not all the QMPs achieve superior outcomes but the organization can capture much of the benefits without subscribing to the full set of quality management practices (Powell, 1995; Dow et al., 1999; Samson and Terziovski, 1999; Rahman and Bullock 2005; Lakhal, 2009; Terziovski, 2006; and Tari et al., 2007). (For more details see Appendices 4 and 5).

Additionally, it is unclear whether the relationship between QM and its outcomes such as quality performance, financial performance, and competitive advantage is direct or indirect (see Section 2.2). Further research is therefore needed to clarify the relationship between QM and its outcomes, including competitive advantage (Dow et al., 1999; Souse and Voss, 2002; Kaynak, 2003; Naire, 2006; Su et al., 2008). The contradictory results of the previous studies might be due to some methodological limitations such as sampling limitations (i.e. different country /or industry), difference in the dimensions that were used to measure the employed construct, and difference in the employed data analysis methods (for more details see Section 2.3). Furthermore, the contradictory results of the previous empirical studies might arise because several factors (apart from QM) can improve the business performance and give the firm a competitive advantage such as effective marketing strategies (Jocumsen, 2002), reputation (Flatt and Kowalczyk 2008), brand equity (Gordon et al., 1993), possession of raw materials, low cost manufacturing , distribution systems, and production capacity (Porter, 1985), government rules (Pekar and Sekanina, 2007), financial structure and access to capital (Juri, 2004), and strategic alliances (Culpan, 2008). However, according to the Ceteris Paribus assumption, the researcher aims to hold constant all these factors other than quality management, so the effect of QM on CA can be isolated by holding all the other relevant factors constant.

Given the limitations of previous studies, this research aims to investigate the relationship between quality management and competitive advantage in the Egyptian hotel industry. Investigating this relationship can give answers to a set of questions: Is QM a uni-dimensional or a multi-dimensional construct? If it is a multi-dimensional construct, which QM practices generate competitive advantage? Does QM have direct or indirect impact on

CA, defined as a firm's above average financial performance for the purpose of the current study (see Section 2.4).

This study is applied in the Egyptian hotel industry where there are a large number of hotels (more than 1000) and very low barriers to entry (Egyptian Ministry of Tourism, 2010). If new competitors can simply enter the industry, this industry can be considered as a highly competitive one (Michael et al., 2011). Therefore, the Egyptian hotel industry can be described as a highly competitive industry in a very well developed destination with a wide range of international chain hotels (80%), besides independent hotels (20%) (Egyptian Ministry of Tourism, 2010). This combination can generally give a good example of hotel industry and the results of the current study can be generalized to similar destinations.

Additionally, according to the Egyptian ministry of tourism (2010), tourism is the main driver of Egyptian economic development. In 2010 the number of inbound tourists climbed to 15 million, bringing revenue in excess of $13 billion dollars. The Egyptian hotel industry is expected to generate about 33% of the Egyptian estimated tourist expenditure by 2012 (Egyptian Ministry of Tourism, 2010). Moreover, the Egyptian hotels sector, besides other sectors such as the transport sector and the attraction sector- which are component of the Egyptian tourism industry- generates approximately 7% of GDP directly, which rises to 11.5% if the direct contribution of more than 70 correlated industries are added. This means almost 40% of total service exports, exceeding all revenues from the other service sectors; this sector brings 23% of foreign exchange, and covers 60% of the trade balance deficit. Every LE1 invested in the tourism sector achieves 400% increase in foreign currency. Moreover, tourism is the most important sector for providing employment, since jobs provided by the sector either direct or indirect, constitute about 12.6% of the total volume of employment in Egypt (Egyptian Ministry of Tourism, 2010).

1.2 Research aim and objectives

The main aim of this study is to investigate the relationship between quality management and competitive advantage in the Egyptian hotel industry. This main aim can be broken down into a number of study objectives as follows:

1- To critically discuss the various conceptual definitions of the current study constructs (quality management and competitive advantage) ;

2- To critically evaluate the value of the previous studies in generating our understanding of the relationship between quality management and competitive advantage;

3- To propose a conceptual framework illustrating the relationship between quality management and competitive advantage;

4- To develop operational definitions for the study constructs (quality management and competitive advantage);

5- To test the dimensionality of the quality management construct;

6- To find out, should quality management construct prove to be multidimensional construct, which quality management practices generate a competitive advantage?

7- To test whether the relationship between quality management and competitive advantage is direct or indirect.

8- To compare the study results (similarities and differences) in relation to the outcomes of previous studies in order to improve our understanding of the relationship between quality management and competitive advantage.

The above objectives were achieved through two methods; first, by critically reviewing the literature (secondary data) in order to achieve objectives no. 1, 2, 3, and 4; and second, by conducting a quantitative study using structural equation modelling (SEM) to attain objectives 5; 6; 7 and 8.

1.3 Research contribution

The main contribution of this research to the body of knowledge concerning sources of competitive advantage was achieved by investigating the impact of quality management on the firm (hotel) competitive advantage to find out if QM is a uni-dimensional construct or a multidimensional construct, and if it is a multi-dimensional construct, which QMPs generate competitive advantage. This contribution can be broken down into: theoretical level contribution, methodological level contribution, and practical level contributions;

1.3.1 Theoretical Level

1- Several studies have examined the relationship between different practices of quality management and business performance. However there is a lack of studies investigating the impact of quality management on competitive advantage, especially in the hotel industry (see Table1.1). Moreover, there is no agreement in the literature on (1) whether QM is a uni-dimensional or a multi-dimensional construct (2) which quality management practices (if multi-dimensional) generate competitive advantage, and finally on whether the relationship is direct or indirect. The current study contributes in providing further evidence that may contribute to enhancing our understanding and knowledge of the relationship between quality management and competitive advantage.

2- The proposed findings may be used as a reference for similar studies to determine the dimensional structure of QM (uni-dimensional or multidimensional) and - if

QM was found to be a multidimensional construct, which quality management practices give the hotel a competitive advantage.

1.3.2 Methodological level

To date and to this author's knowledge, this is the first study that tests the dimensional structure of quality management through testing three models in confirmatory factor analysis (CFA). These models include a model that allows all factors to be freely correlated (oblique factor model), a model where all factors are correlated because they all measure one higher order factor (higher order factor model), and a model where all indicators are employed to test if they measure only one construct (one factor model) . The results of these three models give evidence that QM is a multidimensional construct.

Furthermore, to date and to the author's knowledge, this is the first study that uses the multi group analysis technique in SEM to compare those hotels that have above average financial performance (competitive advantage) with those hotels that have below average financial performance to find out which path coefficients (QM practices) generate a competitive advantage? This has enabled the researcher to effectively identify the causal relationship between QM practices and CA.

1.3.3 Practical Level

1. The findings of this study in general, provide a deeper understanding of quality management practices that may generate a competitive advantage and, in particular, help the hotel managers with the allocation of resources to those QM practices that have the most significant effect on the hotel competitive advantage.
2. The current study findings may enable the hotel managers to revise or modify their current quality management activities in order to gain competitive advantage over their direct rivals.

1.4 Research structure

The following sequence was adopted to ensure a logical structure of the current thesis.

Chapter 1 provides an insight to the research problem, aim and objectives in addition to research outline.

Chapter 2 critically reviews the literature to evaluate the various definitions of quality management and competitive advantage in order to find or propose suitable conceptual definitions for the study constructs. Moreover, it contains a critical evaluation of the previous studies and their role in enhancing our understanding of the relationship between quality management and competitive advantage. Subsequently, a conceptual framework is introduced to illustrate the relationship between quality management and competitive advantage.

Chapter 2 discusses the research methodology, in which the employed research design and methods were presented to investigate the relationship between quality management and competitive advantage. More specifically, this chapter gives answers to a sequence of questions regarding the research philosophy, research approach, research strategy, time horizon, data collection methods and data analytical techniques.

Chapter 4 presents the results of the quantitative analysis of the data that obtained from the questionnaire survey in order to test the dimensional structure of QM through two methods (1) exploratory factor analysis and (2) confirmatory factor analysis. Three models are compared in CFA to test the dimensional structure of QM. These models include oblique factor model, one higher order factor model, and one factor model. Additionally, multi-group analysis in the structural equation modelling (SEM) data analysis technique supported by AMOS V18 was employed to test the causal relationship between quality management and competitive advantage.

Chapter 5 discusses the findings of the current study and explains what these findings actually mean. More specific, the first part of this chapter explains the results of the descriptive analysis and testing the validity and reliability of the research scale. While in the second part the results of testing the dimensional structure of QM through CFA are explained, and finally the results of the multi-group analysis in SEM are explained to identified which QMPs can improve the hotel financial performance and which QMPs can generate CA.

Chapter 6 presents a summary of the major findings of the current study and the contribution and implications of the findings are also discussed. Finally, suggestions for future research and key study limitations were presented, particularly the fact that apart from QM, other factors may also enhance firm financial performance and may give the firm a competitive advantage over its rival, However, according to the Ceteris Paribus assumption, the researcher aims to hold constant all these independent variables other than the one under study (quality management), so the effect of a single independent variable on the dependent variable (financial performance) can be isolated by holding all the other relevant factors constant, in other words, assuming all else is held constant.

Chapter 2: Literature Review

2.1 Introduction

Chapter Two critically reviews the literature about the various definitions of quality management and competitive advantage in in order to find or propose suitable conceptual definitions for the study constructs. Moreover, a critical evaluation of the previous studies is undertaken, to enhance understanding of the relationship between quality management and competitive advantage. Based on the analysis of previous studies, a conceptual framework is proposed to illustrate the relationship between quality management and competitive advantage.

2.2 Definitions of the study concept(s)/construct(s)

Concepts are the basic units of theory development and the building blocks of social research (Zikmund, 2003). This is because without well-developed conceptual definitions for the research terms, it is impossible to develop a coherent theory (Summers, 2001). For example, we cannot develop a meaningful theoretical rationale for why concept A should be related to concept B if the exact meaning of each of these two concepts has not been established; moreover, it is impossible to develop a valid measure of a concept that is not precisely defined (Summers, 2001). Cooper and Schindler (1998:38) have gone so far as to state that "... confusion about the meaning of the research concepts can destroy a research study's value without the researcher even knowing it. If words have different meanings to the parties involved, then they are not communicating on the same wavelength. Definitions are one way to reduce this danger".

It should be noted, however, the importance of defining concepts differs depending on the adopted research approach (Zikmund, 2003). In the quantitative approach, the concepts are clarified and connected to empirical indicators which will be used to operationalize these concepts before the research begins, while in qualitative research concepts remain under construction during the research not only in the operational terms, but also in theoretical terms (Corbetta, 2003). As a result current study uses the quantitative approach (see methodology, Chapter 3), the study concepts/constructs have been defined and operationalized before the beginning of the empirical research.

As the current study investigates the relationship between quality management and competitive advantage; the concept of “quality” and the constructs of “quality management”, and “competitive advantage” had to be defined and then operationalized before the beginning of the empirical research. In the next section these constructs/concept are defined and later the way they were operationalized is explained in the methodology (Chapter Three).

An extensive review of the literature was conducted to find out what makes a good definition. One criterion was adopted form Routio (2009) who identified four criteria a definition should meet: (1) Validity, which means that the definition matches the concept; it refers to just the concept and it measures what it intends to measure, nothing else. (2) Reliability means that if anyone repeats the measurement used, the result will always be the same. (3) The definition must not be a vicious circle, for example, defining quality management as the management of quality. (4) Figurative or obscure language is not used. These four criteria are used to evaluate the existing definition of quality; quality management (QM) and competitive advantage (CA) as follows.

2.2.1 Quality definition

Although the term quality is quite widely used by practitioners and academics, there is no generally agreed definition of it, since different definitions of quality are appropriate under different circumstances (Garvin, 1984; Reeves and Bednar, 1994; Seawright and Young, 1996; Russell and Miles, 1998; Beaumont and Sohal, 1999; Sebastianelli and Tamimi, 2002; Ojasalo, 2006). Indeed, quality has been defined as excellence (Tuchman, 1980), value (Feigenbaum, 1951), conformance to specifications (Shewhart, 1931; Levitt, 1972), conformance to requirements (Crosby, 1979), fitness for use (Juran, 1974; 1988), product desirable attributes (Leffler, 1982), loss avoidance (Taguchi, 1987) and meeting customer expectations (Ryall and Kruithof, 2001; ISO 9000, 2005) (see Appendix 1). A universally accepted definition of quality does not exist for a variety of reasons (these reasons are discussed in detail later in this section). For example, broad definitions (e.g. meeting expectations, excellence) are difficult to operationalize. While narrow definitions (e.g. conformance to specifications, loss avoidance) are not sufficiently comprehensive to capture the richness and complexity of the concept (Reeves and Bednar, 1995).

Several definitions of quality presented in Appendix 1 have been evaluated using Routio's (2009) criteria in order to find or propose a new definition for the purpose of this study as follows.

Garvin (1984) described five basic approaches for quality definition (the transcendent approach; the product based approach; the manufacturing based approach; value- based approach; and the user-based approach). These approaches have been adapted, refined and expanded throughout the literature to define quality (Forker, 1991; Reeves and Bednar, 1994; Seawright and Young, 1996; Russell and Miles, 1998; Fynes and Voss, 2001; Sebastianelli and Tamimi, 2002; Sousa and Voss 2002; Ojasalo, 2006; and Zu et al., 2008)

The transcendent approach of quality as excellence (Tuchman, 1980:380) is derived from philosophy and borrows heavily from Plato's discussion of beauty. In this approach, quality is synonymous with innate excellence (Seawright and Young, 1996). This definition of quality is invalid and contains a figurative language according to Routio's (2009) criteria, as it can be questioned who determines standards of excellence and who determines to what extent excellence has been achieved (Reeves and Bendar, 1995). Moreover, for researchers, a definition of quality based on excellence makes it difficult, if not impossible, to measure quality in the empirical field (Garvin, 1984), which means that it fails to meet the reliability criterion because it is difficult to consistently measure quality.

Given the limitations of defining quality as excellence, Leffler (1982) introduced a measurable (reliable) definition of quality -Garvin (1984) described it as the product based approach- where quality is based on the existence or absence of a particular attribute. If an attribute is desirable, greater amounts of that attribute, according to this definition, would label that product as one of a higher quality. Leffler's (1982) definition of quality, however, is also invalid according to Routio's (2009) criteria (definition does not match the concept) for two reasons. First, quality under this definition may be inappropriate for services, especially when a high degree of human contact is involved (Reeves and Bednar, 1995). Second, according to Leffler's (1982) definition, quality can only be gained at higher cost, because quality reflects the quantity of desirable attributes that a product includes, and because attributes are believed to be costly to produce, quality goods will be more expensive (Garvin, 1984). However, Ishikawa and Lu (1985) argued that quality can be obtained at an acceptable price (value based approach); therefore, the product based approach of defining quality is not a complete definition of quality, in other words not valid (as the definition does not match the concept) according to Routio's (2009) criteria.

Likewise, another measurable (reliable according to Routio's 2009 criteria) definition of quality was introduced by Shewhart (1931) and Levitt (1972), Garvin (1984) described it as the manufacturing approach, where quality is defined as conformance to specification. Quality of conformance reflects the degree to which a product meets certain design standards. Deviations from design specification result in inferior quality, and accordingly increased costs due to rework, scrap, or product failure (Reeves and Bednar, 1995). However, customers may not know or care about how well the product conformed to some internal specifications they did not require (Oliver, 1981). Moreover, this definition fails to address the unique characteristics of services, which require a high degree of human contact (Reeves and Bednar, 1995; Sebastianelli and Tamimi, 2002). As a result, the manufacturing approach of defining quality does not meet the validity criteria (definition does not match the concept, incomplete definition of quality), in particular, it is uncompleted (invalid) definition of quality for the hotel industry, which is made up of both goods and services, where goods reflect the tangible aspects such as a lobby or a guest room and services involve guest interactions with staff or hotel facilities (Barrows and Powers, 2009).

A widely used definition of quality was introduced by Juran (1951) and Juran and Godfrey (1999:2.2) (Garvin, 1984 named it as the user-based approach) which meets all the previous conditions, where quality is defined as "fitness for use". The word use is associated with customer requirements, while *fitness* suggests conformance to measurable product/service characteristics (Nanda, 2005). On the other hand, product/service price may influence the level of the customer satisfaction (Sebastianelli and Tamimi, 2002). For this reason, Broh (1982) and Ishikawa and Lu (1985) refined Juran's (1951) definition of quality to be fitness for use at an acceptable price (value based approach). Broh (1982) and Ishikawa and Lu's (1985) modification strengthens Juran's (1951) definition of quality, but it is still an invalid definition of quality according to Routio's (2009) criteria because customer requirements are continuously changing (Chacko, 1998; Bowie and Bottle, 2004) and what customers require today is not what they required yesterday and will not be what they will require tomorrow (Kano et al., 1984; Hoyle, 2007). Similarly, what the management can do for them today is not what could be done for them yesterday or what it will be possible to do for them tomorrow (Ryall and Kruithof, 2001). In that sense, any attempt to introduce a valid definition of quality should address the continuous review of customer requirements (Hoyle, 2007). As a result, many previous definitions of quality such as those quality definitions proposed by Oakland (2003), American Society for Quality Control (2004), ISO 9000 (2005), Kemp (2006), and Nelsen and Daniels (2007), seem inappropriate and uncompleted (invalid according to Routio's 2009 criteria) as they ignore the continuous review of customer requirements (see Appendix 1).

By the same token, organization success depends largely on its ability to fulfil customer requirements (Barrows and Powers, 2009), but customers are only one group of the organization's stakeholders and there are parties other than the customers that have a stake in the organization and what it does, but may not receive its product/service (Hoyle, 2007). For example, in the hotel industry these stakeholders are owners, supplier, investors, unions, government and society (Barrows and Powers, 2009). With this in mind, the term quality needs to be defined not only relative to customer requirements but also to other stakeholders' requirements as well (Hoyle, 2007). As a result, quality definitions such as those by Flood (1993), Oakland (2003), and Nelsen and Daniels (2007) (see Appendix 1), that ignore other stakeholders' requirements are invalid according to Routio's (2009) criteria.

Equally important, it is worth mentioning that some quality definitions use the term interested parties instead of stakeholders, such as those quality definitions by the International Organization for Standardization (ISO 9000:2005) and Ryall and Kruithof (2001) (see Appendix 1). Interested parties are defined as "a person or group having an interest in the performance or success of an organization" (ISO 9000, 2005:17). However, competitors, criminals and terrorists have an interest in the organization, but it is more likely to be malevolent than benevolent and in these cases the organization fights off their interests rather than seeking to fulfil their requirements or satisfy them, so for the previous reason, the appropriate (valid) word is stakeholders, not interested parties (Hoyle, 2007) .

Moreover, some authors refer to meeting customer expectations in defining quality, (e.g. Ryall and Kruithof, 2001; ISO 9000, 2005) (see Appendix 1). However, often customers do not know what their expectations are, particularly with infrequently purchased products and/or services (Cameron and Whetten, 1983; Lawrence and Reeves, 1993). For this reason, defining quality as meeting customer expectations is considered the most complex definition of quality and thus, the most difficult to measure (Reeves and Bednar, 1994). Therefore, referring to customer expectation in defining quality makes the definition unreliable, according to Routio's (2009) criteria. While, what the customers require from a product/ or service can be identified and fulfilled (measured), so the appropriate meaning of quality is to fulfil customer requirements, not customer expectations (Reeves and Bednar, 1994). Finally, some definitions of quality do not refer to the quality concept but refer to something else, such as Taguchi (1989) definition which defines non-quality rather than quality (see Appendix 1). So, it appears to be an invalid definition of quality, according to Routio's (2009) criteria, because the definition does not match the concept (Logothetis, 1992).

To sum up, according to Routio's (2009) criteria, for any definition of quality to be valid, it must encompass the meaning of conformance to internal specifications (Shewhart, 1931) which are predetermined and required by customers (Crosby, 1979), and fulfils the continuously changing requirements (Bowie and Buttle, 2004) of both the organization customer and stakeholders (Hoyle, 2007). Moreover if anyone wants to measure it in any context (manufacture and service industry) the result should always be the same (Sebastianelli and Tamimi, 2002); in other words, it should be reliable according to Routio's (2009) criteria.

Given the previous discussion, the review of the literature failed to find a valid and reliable definition of quality. Therefore, the current study proposes a new definition of quality mainly drawn from 1SO 9000 (2005) definition of quality as a universal definition introduced by the world's largest developer and publisher of international standards (ISO 9000, 2005), (see Appendix 1) with some modification to emphasise the continuous review of customer requirements in the definition and taking into consideration that the appropriate word to be used in the quality definition is stakeholders, not interested parties, as previously discussed. In light of the above, quality can be defined as below:

> *Quality is a situation when a set of inherent characteristics[2] consistently fulfil the continuously changing requirements of the organization's customers[3] and other stakeholders.*

2.2.2 Quality management definition

After proposing a new definition of quality, quality management construct needs to be defined in the current study. Generally speaking, many definitions of quality management presented in Appendix 2 seem invalid according to Routio's (2009) criteria, due to several reasons: (1) because definitions do not match the concept, such as those quality management definitions by Dow et al. (1999); Sousa and Voss (2002); Nair (2006); Holmlund (2007); and Zu et al. (2008), (2) because some definitions ignore completely the meaning of quality (e.g. quality management definitions by Kaynak and Hartley, 2005; Nanda, 2005), (3) because they imply an inappropriate definition of quality – as previously stated in the quality definition section- (e.g. quality management definitions by Flynn et al., 1994; Dave and Susan,2007), (4) because they do not reflect properly the management concept (e.g. quality management definitions by Bird, 2007; Dave and Susan, 2005), and finally (5) has a vicious circle such as that definition by Klefsjö, Bergquist and Garvare (2008) (see Appendix 2).

More specifically, many scholars such as Dow et al., (1999); Sousa and Voss (2002); Nair (2006); Holmlund (2007); and Zu et al. (2008) defined quality management as a philosophy or an approach to management that can be characterized by its principles, practices, and techniques (see Appendix 2). However, this definition was drawn from Dean and Bowen

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[2] See ISO 2005 quality definition in Appendix 1 for more information about the inherent characteristics
[3] Customers are a part of the organization's stakeholders but because they are the only part who pays and others receive their payment, they (customers) deserve to be mentioned separately in the definition.

(1994) who introduced it as a definition for total quality, not for quality management, so this definition seems an invalid definition of quality management according to Routio's (2009) criteria, as the definition does not match the concept. It is worth mentioning that TQM is considered one approach or level of quality management- that may contain many approaches and practices – in other words, TQM may be a part of quality management not equal to the meaning of quality management (Dale, 2003) which is introduced later.

Similarly, Kaynak and Hartley (2005:256) defined quality management as " ... a holistic management philosophy that strives for continuous improvement in all functions of an organization; quality management can be achieved only if the quality concept is used in all organizational process starting from the acquisition of resources to customer service after the sale". This definition just refers to the quality concept and does not reflect or include the meaning of quality (as previously proposed) within the quality management definition. Therefore, it can be said that it is an invalid definition according to Routio's (2009) criteria. Similarly, Nanda's (2005:8) definition of quality management seems invalid as it introduces a detailed definition of quality management without identifying clearly the meaning of quality, (see Appendix 2).

In the same way, Flynn et al., (1994:342) defined quality management as an " integrated approach to achieving high quality output, focusing on the maintenance and continuous improvement of process and defect prevention at all levels and in all functions of the organization, in order to meet or exceed customer expectations". This definition is invalid and unreliable definition according to Routio's (2009) criteria, because it encompasses an invalid and unreliable definition of quality- meet or exceeds customer expectation- according to what was previously discussed in the quality definition section. Similarly, the quality management definitions introduced by Nelsen and Daniels (2007) and Zairi (1994) did not include a valid definition of quality as previously defined to serve the purpose of the study being undertaken (see Appendix 2).

Furthermore, Klefsjo et al. (2008) argue that quality management should be interpreted as management of quality. This definition is a vicious circle according to Routios's (2009) criteria, as we cannot define something by repeating the same words.

Some other definitions of quality management are invalid according to Routio's (2009) criteria because the definitions are incomplete, as they do not reflect properly the management concept within the definition of quality management, such as the definition by Nelsen and Daniels (2005: 54), who defined quality management as " the application of a quality management system in managing a process to achieve maximum customer satisfaction at the lowest overall cost to the organization while continuing to improve the process". This definition defines quality management by its output, to achieve maximum customer satisfaction at the lowest overall cost and does not reflect the management concept in the definition; the authors refer to managing a process but do not clarify the meaning of management. Similarly, Bird (2007) defined quality management without clarifying an explicit meaning of the management concept within the QM definition (see Appendix 2).

The ISO (2005) definition of quality management, is a universal definition introduced by the world's largest developer and publisher of international standards through a team of experts, academics and practitioners (ISO 9000, 2005), successfully combined the meaning of management and the concept of quality as well (see Appendix 2). This definition is used to serve the purpose of the study being undertaken with slight modification by replacing the definition of quality addressed in ISO (2005) with the quality definition previously proposed. As a result, quality management can be defined as: *practices that direct and control an organization in order to achieve a situation when a set of inherent characteristics consistently fulfils the continuously changing requirements of the organization's customer and other stakeholders.*

2.2.3 Competitive advantage definition

The next construct that needs to be defined in the current study is competitive advantage. Despite the wide use of the construct competitive advantage, few researchers have attempted to define it (Day and Wensley, 1988); moreover, the strategy discipline for many years has been lacking a clear definition of competitive advantage (Flint, 2000; Rumelt, 2003; O'Shannassy, 2008).

Generally speaking, many definitions of competitive advantage presented in Appendix 3 seem invalid according to Routio’s (2009) criteria as the definitions do not match the concept. This is because some authors defined competitive advantage by its sources, such as those definition by Penrose (1959); Barney (1991); Collis and Montgomery (1995); and Wiggins and Ruefli (2002) or they ignore competitors’ existence in the definition of competitive advantage, such as the definition by Porter (1985). Other definitions are figurative according to Routio’s (2009) criteria, as the real meaning is not clear (e.g. Bamberger, 1989; Ma, 2000) (see Appendix 3).

More specifically, several definitions of competitive advantage are invalid according to Routio’s (2009) criteria because competitive advantage is defined as shorthand for sources of competitive advantage, and the definition of the construct (CA) itself is unaddressed (Klein, 2002). However, potential sources of competitive advantage are everywhere in a firm; it may stem from the many distinct activities a firm performs in designing, producing, marketing, delivering, and supporting its product or service (Porter, 1985). Hence, if competitive advantage is to be defined by its sources, a wide range of invalid definitions of competitive advantage can be found, but the competitive advantage definition itself is still unaddressed. For example, Barney (1991:102) emphasized that “a firm is said to have a competitive advantage when it is implementing a value creating strategy not simultaneously being implemented by any current or potential competitors”. Alternatively, Collis and Montgomery, (1995: 120) concluded that competitive advantage can be defined as “the ownership of a valuable resource that enables the company to perform activities better or more cheaply than its competitors". Likewise, Wiggins and Ruefli (2002:84) defined competitive advantage as "a capability (or set of capabilities) or resources (or set of resources) that gives a firm an advantage over its competitors".

In like manner, some definitions of competitive advantage are invalid according to Routio's (2009) criteria because they ignore the competitors' existence in the definition of competitive advantage. An example is the definition by Porter (1985:3) who argue that competitive advantage grows fundamentally out of value a firm is able to create for its buyers that exceeds the firm cost of creating it.

Other definitions of competitive advantage use figurative language according to Routio's (2009) criteria, which creates ambiguity about the real meaning in the definition. For example, defining competitive advantage as a unique position a firm achieves in comparison with its competitors (Bamberger, 1989; Ma, 2000, Thompson and Martin, 2006) may create ambiguity about the real meaning of 'a unique position' and how it can be measured (see Appendix 3).

Several authors introduced a measurable (reliable) definition of competitive advantage according to Routio's (2009) criteria, such as those definitions by Day (1984); Hill and Jones (1998); Flint (2000); Marcus (2005); and Mooney (2007), who defines competitive advantage as achieving above average performance as compared to the firm competitors in its industry. Different dimension of performance are used, such as financial returns indicators (ROI; ROA; ROE) (Hill and Jones, 1998), customer satisfaction (Thomson and Martin, 2006); profits (Flint, 2000); market share (Douglas and Judge, 2001; Agus and Sagir, 2001; Kaynak and Hartley, 2005; Tari et al., 2007; Lakhal et al., 2009), and employee productivity (Samson and Trziovski, 1999; Lau et al., 2004; Kaynak and Hartley, 2005; Rahman and Bollock, 2005) (see Section 2.4)

The previous definition of competitive advantage as above average performance as compared to the firm competitors, can be used to serve the purpose of the current study because it is a valid definition (the definition matches the concept, and does not define CA by its sources, or ignores the competitors in the definition); is clear (no figurative language is included); and reliable (can be consistently measured). This definition implies that there are two conditions that must be met for competitive advantage to have meaning: (1) competitors existence, (2) achieving above- average performance. These two conditions raise two crucial questions: first, how is above average performance measured. This is explained in detail later in section 2.4 on competitive advantage operationalization. Second, which firms are considered direct competitors to the firm? Porter (1980) introduced the strategic group analysis as an answer to the second question; a strategic group is a group of firms in the same industry that follow the same or similar strategies. This type of analysis is useful to identify firms with similar strategic characteristics, such as extent of geographic coverage, product (or service) quality and pricing policy, and therefore to identify who the most direct competitors are and on what basis they compete (Porter, 1980).

2.3 Quality management and competitive advantage: previous studies

This section aims to critically evaluate the value of previous studies in enhancing our understanding of the causal relationship between quality management (QM) and competitive advantage (CA). This has been done through conducting a search in some of the social sciences databases such as ABI/INFOR, Science direct; Business Resource Premium; and Academic Research to review previous studies published between 1989-2011 that investigated the relationship between QM and CA and presented in Appendices 4, 5 and 6. This search found that the relationship between QM and business performance (including product quality, customer satisfaction, and competitive advantage) has received a considerable degree of attention in the extant literature, as illustrated below and in Appendices 4, 5 and 6.

The relationship between quality management and competitive advantage was first explored by Flynn et al. (1995) who divided the quality management practices (QMPs) into two groups: (1) core QMPs which are based on tools and techniques such as product/service design; process management, quality data and reporting, (2) and infrastructure quality management practices such as top management leadership; employee management; customer focus; supplier focus; and quality planning which creates an environment that supports effective use of the core quality management practices. Flynn et al. (1995) concluded that these infrastructure quality management practices can only improve the quality performance and generate competitive advantage (measured by some perceptual variables related to unit cost of manufacturing; fast delivery; flexibility to change; inventory turnover; and cycle time) indirectly through the core quality management practices. Flynn et al. (1995) applied their study in 42 USA manufacturing firms and based their conclusion on path analysis of the data (see Appendix 4).

On the contrary, in his study that investigated the relationship between quality management and competitive advantage, Powell (1995) concluded that some of what Flynn et al. (1995) called infrastructure quality management practices (executive commitment, open organization, and employee empowerment) can directly generate competitive advantage (measured by perceptual variables addressing profitability, sales, growth, and overall financial performance) and the firm can capture much of the benefits without subscribing to the full set of quality management practices. Powell (1995) carried out his study in 54 USA manufacturing and service firms and based his conclusion on correlation analysis.

Several empirical studies came soon after Flynn et al.'s (1995) and Powell's (1995) studies and investigated the relationship between quality management and business performance measured by various indicators such as product quality, financial performance, customer satisfaction, and competitive advantage. Some of these studies measured quality management construct as a unidimensional construct (e.g. Easton and Jarrell (1998), Barker and Emery (2006), Prajogo and Sohal (2006), and Su et al. (2008). Others researchers used several dimensions to measure quality management (e.g. Saraph et al., 1989; Ahire et al. 1996; Dow et al., 1999; Rao et al., 1999; De Cerio, 2003; Conca et al., 2004; Sila and Ebrahimpour, 2005; Lakhal et al., 2006; and Mady, 2008 (see Appendix 4).

Furthermore, competitive advantage was measured in the previous studies according to some perceptual indicators such as fast delivery; flexibility to change; inventory turnover; cycle time, quality improvement and process innovation (Flynn et al., 1995 and Lee and Choi, 2006), while other scholars equal business performance to competitive advantage and operationalized competitive advantage by using either some perceptual indicators of business performance such as customer satisfaction, employee morale, productivity, product reliability, workflow improvement; and revenue growth (Samson and Terziovski , 1999; Rahman, 2001; Singels et al., 2001; Kaynak, 2003; Hafeez et al., 2006; Prajogo and Sohal, 2006), or by using some objective measures such as return on assets (ROA); return on investment (ROI); market share; growth of stakeholders' equity; return on equity (ROE); and earnings per share (EPS) (Easton and Jarrell, 1998; Agus and Sagir, 2001; Chow-Chua et al., 2003; Wayhan et al., 2002; Douglas and Judge, 2001; Barker and Emery, 2006) (see column 3 in Appendix 5).

However, the concluded results (as has been noted in Appendices 4, 5, and 6) suffer from a lack of clarity in three main areas: (1) the dimensional structure of quality management, (2) which quality management practices generate superior outcomes including CA, and (3) whether the relationship between quality management and CA is direct or indirect. This lack of clarity might be due to some methodological limitations such as sampling limitations (i.e. different country /or industry), difference in the dimensions that were used to measure the employed construct, and difference in the employed data analysis methods as explained below.

(1) Lack of clarity regarding the dimensional structure of quality management

Several quality management practices have been investigated in previous studies, such as customer focus, top management commitment; leadership; employee training; employee relations; quality information and reporting; process management; supplier management; product and service design; statistical process control; and quality planning (see column 3 in Appendix 5, and Appendices 6 and 7). However, there is a lack of clarity concerning the dimensional structure of the quality management construct and which data analysis method can test this dimensionality. In other words, there is a lack of clarity regarding, whether the quality management construct was measured by a single dimension (uni-dimensional), or by several dimensions (multidimensional). More specifically, Easton and Jarrell (1998) assume that quality management QM is uni-dimensional construct without giving statistical evidence. Instead, they selected companies that had obtained quality certificates to indicate that quality management existed in the company. In this study, QM is not tested empirically in terms of its dimensions but simply assumed to be a uni-dimensional construct, with no practices (dimensions) specified.

Other scholars, such as Kaynak and Hartley (2005) and Terziovski (2006), assumed that quality management is a multidimensional construct (several dimensions were assumed to measure the quality management construct), but found that the single individual dimensions of QM is unable to enhance business performance (different indicators of performance were used in each study to measure the business performance, see Appendices 4 and 5). Therefore, they concluded that if QM is to be a competitive strategy, organizations must adopt an integrative approach to implement QM because firms cannot capture full benefits when they implement only specific QM practices. More specifically, Kaynak and Hartley (2005) assumed that there are eight dimensions of quality management (management leadership, training, employee relations, quality data and reporting, customer relations, supplier management, product service and design, and process management) but found (after analysing the data with cluster analysis) that selected dimension(s) of QM cannot improve business performance. Therefore, a single average composite score for each of the six dimensions was calculated to form six variables which then were used in the final model using cluster analysis. Similarly, Terziovski (2006) assumed six dimensions to measure QM (leadership, customer focus, people management, strategic planning, information & analysis and process management). A composite average score for each dimension was then calculated to form six variables which then were used in multiple regression analysis to conclude that only multiple quality management practices, when implemented simultaneously, have a significant and positive effect on business performance. Notably, the previous two studies did not employ any analytical method to test the dimensional structure of the quality management construct.

On the contrary, Douglas and Judge (2001) used seven dimensions to measure quality management (top management team involvement, quality philosophy, emphasis on TQM – oriented training, customer driven, continuous improvement, management by fact, and total quality methods), and employed the EFA (using principal component analysis PCA) to confirm that each set of indicators is correlated to the pre-assumed dimension and then calculate a single average value for each of the seven dimensions to form seven variables; and to confirm that these seven variables represent one dimension which was finally used in the final model to test the relationship between TQM and CA. In a similar way, Prajogo and Sohal (2006) assumed six dimensions of QM (leadership, strategic planning, customer focus, information and analysis, people management, and process management) and then used the EFA as a data reduction method to gather these six dimensions into six composite variables (each with a single average value). These six variables were then used as indicators of QM as a single latent construct in the final model that was tested through SEM using AMOS.

Likewise, Su et al. (2008) assumed that there are eight dimensions of QM (customer focus and satisfaction, employee training, leadership and top management commitment, cross-functional quality teams, continuous improvement and innovation, quality information and performance measurement, and statistical process control) and then used the average of each dimension as a composite single score to form eight indicators of QM as a latent single construct in the final model, which was tested through SEM using AMOS. Similarly, Saraph et al. (1989); Conca et al. (2004); De Cerio (2003); Mady (2008); Flynn et al. (1994); and Zu (2008) assumed that QM is multidimensional construct with several pre assumed dimensions to measure QM (see Appendix 4) and conducted either EFA or CFA for each single dimension of QM to test its uni-dimensionality; however, the dimensional structure of QM itself was statistically untested (see Appendix 4). Similarly, Barker and Emery (2006) assumed eight dimensions of QM (top management commitment, customer focus, supplier relationships, employee training, employee involvement, continuous improvement, design and process improvement, and internal cooperation and open organization) and employed CFA to test each single dimension's validity and then a single composite score was used in the final model using regression analysis (see Appendix 4).

Notably, all the previously discussed empirical studies assumed the existence of several dimensions of quality management but in the final model they used either a single average value to measure quality management or transferred these dimensions into composite variables (after conducting either EFA or CFA for each single dimension) to measure the quality management construct .

In contrast, other scholars such as Ahire et al. (1996); Dow et al. (1999) and Sila and Ebrahimpour (2005) assumed that QM is a multidimensional construct and found that QM is a multidimensional construct in the final model. More specifically, Ahire et al. (1996) in their study aimed to develop and validate the implementation of the QM construct, assumed that QM is a multidimensional construct that can be measured through 12 dimensions and then used EFA to refine the dimensions and used CFA to validate each dimension. They concluded that QM is a multidimensional construct. Likewise, Sila and Ebrahimpour (2005) assumed the existence of seven dimensions of QM and then used CFA for each single dimension to confirm its unidimensionality and then used all the dimensions with their related indicators in the final model using SEM with AMOS. Similarly, Dow et al. (1999) assumed that QM is a multidimensional construct that can be measured through nine dimensions and then used EFA to refine the dimensions and used CFA for all the nine dimensions together. They concluded that QM is a multidimensional construct in the final model using SEM through LISREL (see Appendix 4).

It can be seen from the above analysis that, the lack of clarity regarding the dimensional structure of the quality management construct is because all the discussed empirical studies either did not use any statistical technique to test the dimensional structure of the quality management construct, or used EFA for this purpose. However, as Hunter and Gerbing (1982:273) suggest "EFA is a poor ending point for the construction of a uni-dimensional scale". EFA combines highly correlated items into the same dimension (Pallant, 2007), while variables might be correlated for several reasons, besides being measures of the same dimension (Rubio, Berg-Weger, and Tebb, 2001). Indeed, it is CFA that can be employed not only to test the construct validity but to test the dimensional structure of the construct in various ways: (1) all the study indicators might be tested to find out if they can be employed to measure only one factor (one factor model) ; (2) all the dimensions might be allowed to be freely correlated (oblique factor model); or (3) all the dimensions might be correlated because they all measure one higher order factor (higher order factor model) (Byrne, 2010).

(2) Lack of clarity which quality management practices generate superior outcomes

Generally speaking, there is lack of clarity and even contradictory results among those authors who employed QM as a multidimensional construct, on which quality management practices generate superior outcomes including CA. This may be due to either the difference in dimensions that were employed to measure QM and CA or the difference in the data analysis methods employed in these studies. For example, both Powell (1995) and Flynn et al., (1995) investigated the relationship between QM and CA. However, conflicting findings emerged. More specifically, Powell (1995) used eleven dimensions (QMPs) to measure QM , but only three dimensions: executive commitment ($r = 0.41$, $p < 0.001$) , open organization ($r = 0.61$, $p < 0.001$) , and employee empowerment ($r = 0.64$, $p < 0.001$) found to have positive and significant association with competitive advantage (measured by some perceptual variables related to revenue, sales growth and profitability), while eight QM dimensions (i.e. adopting the quality philosophy , closer to customers, closer to supplier, benchmarking, zero defects mentality, flexible manufacturing, process improvement) were not found to be significantly related to competitive advantage. In contrast, Flynn et al. (1995) used eight dimensions (QMPs) to measure quality management, of which seven (top management support, customer relationship, supplier relationship, workforce management, work attitudes, product design process, and statistical control /feedback) were found to be significantly and positively related to competitive advantage, measured by some perceptual variables related to unit cost of manufacturing; fast delivery; flexibility to change; inventory turnover; and cycle time (R^2 indicated that they explained slightly over a third of the variance in competitive advantage) , while one QM dimension (process flow management) was not found to be positively related to competitive advantage. The difference in the dimensions that were used to measure QM and CA might explain the contradictory results of the two studies (see Appendix 5).

Mixed results of previous studies might also be due to the differences in the analytical methods that were used and the context in which these studies were conducted. Powell (1995) carried out his study in 54 USA manufacturing and service firms and based his conclusion on correlation analysis, while, Flynn et al. (1995) did their study in 42 USA manufacturing firms and based their conclusion on path analysis (see Appendix 5). While, correlation analysis identifies the strength of a linear relation between two random observed variables (Tabachnick and Fidell, 2007), path analysis takes the analysis one step further and allows modelling of explanatory relationships between several independent observed variables and several dependent observed variables (Schumacker and Lomax, 2004). As a result these two methods cannot be employed to serve the purpose of the current study which tests the causal relationships between two latent variables (i.e. QM and CA).

Similarly, several empirical studies such as those conducted by Samson and Terziovski (1999); Dow et al. (1999); Kaynak (2003); Merino-Diaz (2003); Sila and Ebraimpour (2005) ; Lakhal et al. (2009); Tari et al. (2007); Su et al. (2008); and Zu et al. (2008) investigated the relationship between quality management and business performance measured by product quality, quality performance, operational performance, financial and business performance and a lot of mixed and contradictory results emerged from these empirical studies (see Appendix 5). More specifically, both Samson and Terziovski (1999) and Dow et al. (1999) investigated the relationship between QM and business performance. Samson and Terziovski (1999) assumed six dimensions to measure QM and found only three QM dimensions ; leadership (r = 0.15, p < 0.001), staff management (r = 0.25, p < 0.001) , customer focus (r = 0.12, p < 0.001), that had positive and significant relationships with business performance (measured by some perceptual indicators related to customer satisfaction, employee morale, productivity, defects as a percentage of production volume, warranty claims cost as a percentage of total sales , cost of quality as a percentage of total sales, and delivery in full on time to customer) while three QM dimensions (strategic quality planning , information and analysis and process management) were not found to have positive relationships with business performance. In contrast, Dow et al. (1999) used seven dimensions to measure QM and only three paths coefficient: workforce management, shared vision, and customer focus, were found to have positive and significant relationships with business performance (measured as a single perceptual construct containing indicators related to: the percentage of defects at final assembly, an assessment of the defect rate relative to competitors, the total cost of quality, the cost of warranty claims). The other four QM dimensions (benchmarking, advanced manufacturing technologies, close supplier relations, and work teams) were not found to have positive relationships with business performance (see Appendix 5). This difference in the findings of the two studies may be due not only to the difference in the dimensions that were employed to measure QM, but also due to the difference in the data analysis methods that were employed. Samson and Terziovski (1999) did their study in 1024 Australian and New Zealand manufacturing firms and based their conclusion on multiple regression analysis, while Dow et al. (1999) carried out their study in 698 Australian manufacturing firms and based their conclusion on SEM. While, multiple regression analysis reveals relationships among observed variables (several independent variables and single dependent variable), it does not imply that the relationships are causal. Additionally, regression analysis assumes that independent variables are measured without error, which is a clear impossibility in most social science research (Tabachnick and Fidell, 2007). In contrast, SEM is an appropriate technique to analyse multiple and interrelated causal relationships among latent and/or observed variables for model building , besides taking into account the estimated measurement error related to the imperfect measurement of variable(s) as well (Hair et al., 2006; Tabachnic and Fidell, 2007; Chen and Quester, 2008; and Byrne, 2010).

However, some authors employed the same dimensions to measure both QM and CA or business performance as an indicator of CA, but they obtained different results. This might be due to sampling limitations (i.e. studies carried out in a different industry / country) or due to using different methods to analyse the empirical study findings. For example, studies conducted by Feng et al. (2006) and Fening et al. (2008) used the same dimensions to measure the study constructs but obtained different results. Feng et al. (2006) and Fening et al. (2008) both investigated the relationship between QM and business performance using six dimensions to measure QM (leadership, strategic planning, information analysis, human resource management (HRM), process management, customer focus) and some perceptual indicators to measure the business performance related to quality performance innovation performance, customer satisfaction, employee morale and market share. While, Feng et al. (2006) found a positive relationship between four QM dimensions (leadership, human resource management, customer focus and process management) and some aspects of business performance (product quality, innovation performance), two QM dimensions (strategic planning and information & analysis) were not found to be related to any level of the business performance. In contrast, Fening et al. (2008) found a positive relationship between all the QM dimensions investigated (except information and analysis) with some different aspects of performance (customer satisfaction, employee morale and market share) (see Appendix 5). Thus, while the same dimension were employed in both previous studies to measure the study constructs (QM and business performance), different results were obtained. This might be due to the difference in the study context (Feng et al., 2006 carried out the study in Australian and Singaporean manufacturing and service industries, while, Fening et al. (2008) did the study in manufacturing and service industries in Ghana). They might also be due to the difference in the analytical methods used; Feng et al. (2006) based their conclusion on SEM, while Fening et al. (2008) based their conclusion on multiple regression. It is important to note that, as previously explained, multiple regression analysis is concerned solely with the observed variable (which is assumed to be measured without error) and does not imply causality. However, SEM can illustrate the causal relationship between one or more latent and/or observed variables taking into consideration measurement error (Byrne, 2010).

(3) Lack of clarity regarding whether the relationship between QM and CA is direct or indirect.

Generally speaking, there is a lack of clarity concerning whether the relationship between quality management and competitive advantage or business performance is direct or indirect. For example, Kaynak, (2003); Zu et al. (2008), and Su et al. (2008) all investigated the relationship between QM and business performance and found that QM is not directly related to business performance but indirectly related through other variables. Kaynak (2003) found that all the investigated QMPs are indirectly related to the business performance through quality performance (measured by some perceptual indicators related to productivity, cost of scrap and rework as a percentage of sales, delivery lead-time of purchased materials). This conclusion was based on using seven dimensions to measure QM (process management, product/service design, leadership management, supplier management, employee relations, training, and quality data &reporting) while, business performance was measured by two perceptual indicators related to financial and market performance (return on investment, profit growth , market share , market share growth, sales growth); and inventory management performance(purchase material turnover, total inventory turnover).

In their study of Su et al. (2008) concluded that all the investigated QMPs were indirectly related to organization performance through two variables: quality performance (measured by some perceptual variables related to the percentage of defects at final assembly; product quality; durability; reliability; and delivery on time) and research and development (R&D) performance (measured by some perceptual variables related to mistakes rate of design; R&D time; R&D competency; R&D costs). This conclusion was based on using eight practices to measure QM (customer focus and satisfaction; employee training; leadership and top management commitment; cross-functional quality teams; employee involvement; continuous improvement and innovation; quality information; and statistical process control) and business performance was measured by some perceptual indicators related to sales growth; market share; and growth in market share.

Likewise, Zu et al. (2008) concluded that only two QMPs (process management and product/service design) are directly related to business performance (measured by some perceptual variables related to sales, market share, operating income, profits, and return on assets), while five QMPs (top management support, customer relationship, supplier relationship, workforce management; and quality information) are indirectly related to business performance through quality performance (measured by some perceptual variables related to cycle time, cost of scrap and rework, customer satisfaction, and delivery). Zu et al. (2008) did their study in USA manufacturing firms, using factor analysis as the main data analysis method.

In contrast to the previous argument, several authors concluded that the relationship between QM and business performance can be both direct and indirect, claiming that some QMPs are directly related to business performance and other QMPs are indirectly related to business performance through supporting these QMPs that are directly related. However, they differed on which QMPs are directly related to business performance and which are indirectly related. For example, Sila and Ebraimpour (2005) concluded that only two QMPs (leadership and process management) were directly related to the business performance while other QMPs are indirectly related to business performance through these two QMPs. They based their conclusion on using nine QMPs (leadership, process management, strategic planning, customer focus, information and analysis, benchmarking, quality tools, human resource management, supplier management) to measure QM and business performance was measured by some perceptual indicators related to human resource results; financial and market results; and organization effectiveness results.

In a later study, Tari et al. (2007) found two different QMPs (Human resource management and continuous improvement) to be directly related to the quality outcomes while other QMPs are indirectly related to quality outcomes through these two QMPs. They based their results on using eight QMPs (Human resource management , continuous improvement, leadership, customer focus, supplier management, quality planning, learning, quality techniques & tools) and the quality outcomes were measured by some perceptual indicators related to financial results, profitability, revenue, and competitive position (see Appendix 5 for more details).

The previous contradictory results might be due to the difference in the number of factors that were used to measure QM (as previously explained) or due to the variation in the mediating and/or intervening factors that were used in investigating the relationship between QM and its outcomes. For example, Flynn et al. (1995) used quality performance as a mediating variable between QM and CA. Powell (1995) used number of years since the QM practices adopted in the firm as an intervening variable between QM and business performance. While, Easton and Jarell (1998) used the organization size and gaining a quality award as intervening variables between QM and financial performance, Barker and Emery (2006) used the industry specialist as an intervening variable between QM and financial performance (see Appendix 4).

Finally, other factors also might influence business performance and give the firm a competitive advantage over its direct rivals such as effective marketing strategies (Jocumsen, 2002), reputation (Flatt and Kowalczyk, 2008), brand equity (Gordon et al., 1993), possession of raw materials, low cost manufacturing, distribution systems, and production capacity (Porter, 1985), government rules (Pekar and Sekanina, 2007), financial structure and access to capital (Juri, 2004), and strategic alliances (Culpan, 2008). However, all the previously discussed empirical studies adopted the Ceteris Paribus assumption to hold constant all the independent variables, which can affect business performance or competitive advantage, other than the one under study (QM). Hence variable results may occur.

To conclude, the discussion of the previous empirical studies that investigated the relationship between quality management and competitive advantage or business performance as an indicator of competitive advantage demonstrate that there is lack of clarity in three main areas: (1) the dimensional structure of quality management, (2) which quality management practices generate superior outcomes including competitive advantage, and (3) whether the relationship between quality management and competitive advantage is direct or indirect. This may be due to some methodological limitations related to one (or more) of three main reasons: (1) the difference in the dimensions employed to measure QM and CA, (2) the context in which the study was conducted (i.e. sampling limitations such as different industries/countries) (3) or difference in the data analysis techniques that were used to analyse the findings.

The above lack of clarity explains the need of this study to identify the dimensional structure of QM, which QM practices generate competitive advantage, and whether the relationship between QM and CA is direct or indirect. These objectives are achieved in the current study through: first, provide a clear operationalization for the study constructs; quality management and competitive advantage (see operationalization of the study constructs section 3.1.1) Second, since some sampling limitations (i.e. different industries/countries) may be a reason for the contradiction that exists in the findings of the previous empirical studies, as previously mentioned, consistence with the findings of Su et al. (2008) that the industry type affects the nature of the relationship between QM and financial performance, to avoid such discrepancies the relationship between QM and CA is investigated in one context ; the Egyptian hotel industry (see methodology Chapter Three). In this regard, there is not only a clear shortage of studies that investigate the impact of quality management on competitive advantage, but also an absence of studies that investigate this relationship in hotel industry, which is considered one of the most competitive industries that can benefit from employing quality management to increase its competitive advantage (see Table 1.1) .

Third, the diversity in analytical methods (i.e. correlation analysis, multiple regression analysis, path analysis) used in the previous empirical studies to investigate the relationship between quality management and business performance (as an indicator of CA) might contribute to the discrepancies in the findings of the previous studies, because these data analysis methods do not imply causality or include latent and observed variables in the model. Therefore, these data analysis methods are not appropriate to achieve the aim of the current study which investigates the causal relationship between two latent constructs (QM and CA). Therefore, multi group analysis in SEM was employed in the current study as it can investigate the causal relationship between two latent constructs, QM and CA, and to find out which QM can generate CA and whether the relationship between QM and CA is direct or indirect.

2.4 Research framework and hypotheses

The aim of this section is to propose a conceptual framework illustrating the relationship between quality management and competitive advantage. A conceptual framework is a structure of concepts and/or theories which are pulled together as a map for the study, (Liehr and Smith, 2009). A conceptual framework is a fundamental part of a quantitative research study as it explains the research questions or hypotheses, while in a qualitative study, it may be less important or less clear in its structure (Collis and Hussey, 2003; Punch, 2005). The conceptual framework, basically, represents a movement from confusion to certainty (Dwivedi, 2008) and provides clarity, focus and simplicity to the research task (Punch, 2005). Moreover, it clears away all the issues and materials that are not germane to the research topic and question (Dwivedi, 2008), helps to make explicit what we already know and think about the research topic (Punch, 2005) and finally it provides structure and coherence to the researcher's dissertation (Dwivedi, 2008).

An extensive critical review of the previous studies that investigated the relationship between QM and its outcomes including quality performance, financial performance and competitive advantage has been conducted (see Section 2.2). This literature review has assisted in proposing a conceptual framework to serve the purpose of the current study, which investigates the causal relationship between quality management- as an independent variable- and competitive advantage- as a dependent variable- in the hotel industry.

It is worth noting here that two categories of QM practices were widely used in previous studies: (1) core QM practices which refer to tools and techniques such as process management, quality data and reporting, and (2) infrastructure QM practices which create an environment that supports effective use of the core quality management practices and include top management leadership, employee management, customer focus, and supplier management. This categorization of QM is not adopted in the current study because core QMPs, as first coined by Flynn et al. (1995), imply that some set of combined practices should be implemented together to form what are called core QMPs and infrastructure QMPs. However, this assumption contradicts what has been discussed in Section 2.3 which provide empirical evidence that individual quality management practices can be employed to obtain competitive advantage. Moreover, these definitions imply that the infrastructure QMPs should be indirectly related to quality performance through the core QMPs. However, there is evidence from the literature review (see Section 2.2) that some of the infrastructure QMPs can be directly related to quality performance (and even to financial performance), while some other core QMPs may be indirectly related to quality performance (and even to financial performance) (see Appendix 5). The two groups of QMPS (infrastructure and core) were used in Appendix 5 for one reason to simplify the picturing of the previous studies finding.

A conceptual framework, based on previous empirical studies as in Appendix 5, is proposed to serve the purpose of the current study, which investigates the relationship between QM and CA, as follows.

There is contradiction in the literature review on the dimensional structure of quality management (whether QM is a unidimensional or multidimensional construct), as discussed in previous studies section 2.2. As a result, the following hypotheses are proposed:

Hypothesis 1: QM is a uni-dimensional construct.

Hypothesis 1a: QM "as a uni-dimensional construct" has a positive effect on competitive advantage.

H0: QM is a multidimensional construct.

However, there is no agreement among those scholars who employed QM as a multidimensional construct on: (1) which QMPs generate superior outcomes (including financial performance, and competitive advantage), and (2) whether the relationship between QM and its outcomes is direct or indirect. In the current study six main practices of quality management (top management leadership, employee management, customer focus, supplier management, quality data & reporting, and process management) were employed to measure QM because they are the most frequently and widely covered and validated in the previous empirical studies (see Appendix 6 and Section 3.1).

Upper Echelons theory[2] highlights the important role of top management in determining work processes and improving organizational performance (Finkelstein and Hambrick, 1996; and Hambrick and Mason, 1984). Top management leadership, with regard to quality, means that the organization top management is accepting its responsibilities for quality leadership through providing the necessary resources for the implementation of QM efforts, particularly considerable investment in human and financial resources (Kaynak and Hartley, 2007). Top management is responsible for developing quality strategies and goals to enable successful implementation of QM (Barker and Emery, 2006). The importance of top management leadership in the successful implementation of QM, is well documented by quality gurus (Deming, 1982; Juran, 1988; 1998), and supported by several measurement studies (Saraph et al., 1989; Flynn et al., 1995; Powell, 1995; Ahire and O'Shaughnesy, 1998; Agus and Sagir, 2001; Rahman, 2001; Prajogo and Browln, 2004; Barker et al., 2006). Moreover, one key set of the top management leadership responsibilities is quality planning (Marta et al., 2005). Quality planning (e.g. policies, objectives, values) is necessary in order to manage quality throughout the organization (Juran, 1988; Saraph and Sebastian, 1993). Top management leadership acts as a driver of QM implementation by creating, goals, polices, values, and systems to fulfil customer and other stakeholder requirements and consequently improve business performance (Ahire et la., 1996; Rao et al., 1999; Conca et al., 2004; Sila and Ebrahimpour, 2005; Tari et al., 2007)

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[2] Upper Echelons theory suggests that top managers have large influence on organization strategy, and performance. Top managers will act based on their personalized cognitive backgrounds, which are based on their experience, personalities and values. Hence, their demographic background is one of the important factors that would highly affect the entire organization performance (Hambrick and Mason, 1984).

Several empirical studies such as those conducted by Powell (1995); Dow et al., (1999); Samson and Terziovski (1999); Rahman and Bullock (2005); Nair (2005); Lakhal et al. (2006); and Sila and Ebrahimpour (2005) found that top management leadership has a direct positive impact on many business performance measures (including financial and operational results), and has positive effects on other quality management practices such as customer focus (Lambert,1998; and Agus et al., 2000), employee management (Tari et al., 2007; and Sila and Ebrahimpour ,2005), supplier management (Tari et al., 2007) , quality data and reporting (Flynn et al., 1995; Kaynak, 2003; and Lakhal et al., 2006), and process management (Flynn et al., 1995; Kaynak, 2003; Sila and Ebrahimpour , 2005; and Lakhal et al., 2006).

Based on the above literature review the following hypotheses are proposed (see figure 2.1):

Hypothesis 2: Top management leadership has a positive effect on firm financial performance.

Hypothesis 2a: Top management leadership has a positive effect on customer focus.
Hypothesis 2b: Top management leadership has a positive effect on employee management.
Hypothesis 2c: Top management leadership has a positive effect on supplier management.
Hypothesis 2d: Top management leadership has a positive effect on quality data and reporting.
Hypothesis 2e: Top management leadership has a positive effect on process management.

Employee management includes a variety of employee quality related practices such as employee training in quality management methods and principles (Flynn et al., 1995; Kaynak, 2003; Sila and Ebrahimpour, 2005), employee relations in order to build an awareness of the quality goals (Daft, 1998; Kaynak, 2003), employee involvement in quality related discussions and decisions (Ahireet al., 1996; Choi, 1995), teamwork in order to solve problems (Daft, 1998; Flynn et al., 1995), and employee empowerment[3] in order to encourage employees to prevent and/ or detect errors first time they arise in the process rather than depending on inspections (Barker and Emery, 2006) (see Section 3.2.1 and Appendix 6). Employees are those who perform the processes, and therefore they are the ones that can act upon such processes in order to develop quality (Tari et al., 2007) which in turn increases profit (Flynn et al., 1995; Kaynak, 2003; and Lakhal et al., 2006).

Several studies highlighted the key role of employee management for the proper implementation and success of QM (Powell, 1995; Easton and Jarell, 1998; Agus and Sagir, 2001; Rahman, 2001; Sila and Ebrahimpour, 2002; Rahman and Bullock, 2005). Overall performance and employee satisfaction is enhanced when employee receive technical and vocational work-skills training which creates value for both employer and employee (Leonard and Sasser, 1982; Rao et al., 1999; Sila and Ebrahimpour, 2002; Tari et al., 2007). Moreover, empowering employees encourages them to take responsibility for their own work and to be more proactive in suggesting and finding solutions for problems as they arise. Therefore, empowerment can lead to significant saving and increase in profits by reducing rework (Ahire et al., 1996).

Also, when employees are trained in quality tools and methods, they can understand quality-related issues, which help towards subsequent improvements. For instance, techniques and tools such as cause–effect diagrams, Pareto charts or scatter diagrams, amongst others, help employee to reduce variations and identify improvement areas (Deming, 1982). Several empirical studies found evidence that employee management has a positive direct impact on overall business performance (including financial performance, employee productivity and operational performance (Powell, 1995; Dow et al., 1999; Samson and Terziovski, 1999; Chang and Chen, 2002; Merino-Diaz, 2003; Rahman and

[3] Employee empowerment is "giving workers the training and authority they need to manage their own jobs" (Raiborn, Barfield & Kinney, 1996, p. 49).

Bullock, 2005; Lakhal et al., 2006; Tari et al., 2007). Additionally, there is evidence that happy employee makes happy customers (Kaynak, 2003) because a primary objective of employee management is to create a workforce that is energized by a superior ability to produce product or service that meet customer requirements and consequently create profit (Ugboro and obeng, 2000). In this regard, some empirical studies such as those by Ahire et al. (1996), and Kaynak and Hartley (2008) found a positive impact of employee management on customer focus. Additionally, employee management also affects process management by developing a team problem-solving approach so that employees from different departments can suggest inputs, which helps to improve the designed product and to make process improvement suggestions (Flynn et al., 1995; Sila and Ebrahimpour, 2005).

Based on the above literature review the following hypothesis is proposed (see figure 2.1):

Hypothesis 3: Employee management has a positive effect on firm financial performance.

> *Hypothesis 3a: Employee management has a positive effect on customer focus.*
>
> *Hypothesis 3b: Employee management has a positive effect on process management.*

A customer-focused organization is basically different from the traditional organization (Rao et al., 1999). In a traditional organization, cost and efficiency are the main drivers of the company, while in a customer-focused organization fulfilling customer requirements drives all the actions of the company (Doll and Vonderembse, 1991). Customer focus QM practice addresses how and how well the company deal with its external customers to determine and fulfil their requirements, provide active relationship with customer, and determines customer satisfaction (Evans and Lindsay, 1995; and Barker and Emery, 2006). It is not surprising that customer focus is one of the main QMPs that received the highest coverage in the QM literature review (see Appendix 6), given the common wisdom based on an empirical evidence that fulfilling customer requirements is the main goal of all types of organizations, to increase their profitability. In this regard, several empirical studies such as those conducted by Ahire and O'Shaughnesy (1998); Dow et al. (1999); Samson and Terziovski (1999); Rahman and Bullock (2005); Lakhal et al. (2006) and Feng et al. (2006) found a direct positive relationship between customer focus and business performance in various indicators, including financial performance, customer satisfaction and product quality. As a result the following hypothesis is proposed (see figure 2.1):

Hypothesis 4: Customer focus has a positive effect on firm financial performance.

Deming (1982) was the first author who highlighted the importance of establishing a long term relationship with high reputation suppliers -based on quality- for the proper implementation of QM. Supplier management is critical for firm success in many ways. First, the quality of the supplied materials, to an extent, determines the final product quality (Ahire and O'Shaughnesy, 1998; Rahman and Bullock, 2005). Second, supplier capabilities, to react to the firm need, in turn, can determine the firm flexibility in responding to the customer requirements (Rao et al., 1999; Conca et al., 2004; Rahman and Bullock, 2005). In this respect, several authors such as Ahire and O'Shaughnesy (1998); Rahman and Bullock (2005); and Lakhal et al. (2006) found a positive direct impact of supplier management on business performance, including quality performance, financial performance, and customer satisfaction. Additionally, the production of quality products is essentially dependent on the quality of the raw materials supplied (Flynn et al., 1995); as a result, improving the quality of purchased materials and parts- which might be a main source of process inconsistency- will have a positive influence on process management (Flynn et al., 1995). This can be done through eliminating variance in materials and parts, which make it possible to utilize internal controls to reduce rework and waste, then improve the profitability (Tari et al., 2007). Based on the above, the following hypothesis is proposed (see Figure 2.1):

Hypothesis 5: Supplier management has a positive effect on firm financial performance.

Hypothesis 5a: Supplier management has a positive effect on process management.

Quality data and reporting (known as *measurement, analysis and knowledge management in* Malcolm Baldrige National Award Criteria) is concerned with the use of data and information to sustain a customer focus, to drive quality excellence, and to improve performance (Brown, 2008). Quality data and reporting comprise using of poor quality related data such as rework, warranty and scrap costs, and control charts to recognize quality problems and suggest information for possible improvement (Choi, 1995; Ho et al., 1999; Lockamy, 1998). In this regard, evaluation and decision – making at all levels of the organization are supported by key process information to improve the quality performance and the overall organization performance (Rao et al., 1999; Sila and Ebrahimpour, 2005). Additionally, it is the analysing of quality information -not just their availability- that helps firms to achieve the desired quality levels and increase their profitability (Rao et al., 1999; Sila and Ebrahimpour, 2005). In this regard, several authors such as Ahire and O'Shaughnesy (1998); and Sila and Ebrahimpour (2005); Lakhal et al. (2006) found a direct positive impact of quality data and reporting on the business performance in several indicators, including financial performance, customer satisfaction, product quality. Additionally, there is empirical evidence that the positive effect of quality data and reporting on business performance can be achieved through three other QM practices: employee management (Sila and Ebrahimpour, 2005), customer focus (Ahire et al., 1996), supplier management (Kaynak and Hartley, 2008).

Based on the above, the following hypothesis is proposed (see Figure 2.1):

Hypothesis 6: Quality data and reporting has a positive effect on firm financial performance.

Hypothesis 6a: Quality data and reporting has a positive effect on employee management.

Hypothesis 6b: Quality data and reporting has a positive effect on customer focus.

Hypothesis 6c: Quality data and reporting has a positive effect on supplier management.

Process management aims at improving techniques and processes by creating mistake-proof processes to decrease process variation (Flynn et al., 1995; Saraph et al., 1989). This can be done by employing preventive maintenance systems to enhance reliability and to eliminate production interruptions, which has a positive impact on enhancing productivity and profitability (Kaynak, 2003; Sila and Ebrahimpour, 2005). Also, the analysed quality related data can be used to identify and correct quality problems instantly, which reduces reworks and waste and consequently improves productivity and profitability (Ahire and Dreyfus, 2000; Forza and Flippini, 1998). Accordingly, there is evidence based on empirical studies conducted by Forza and Flippini (1998) that process management positive affect quality data and reporting.

Based on above the following hypotheses are proposed (see Figure 2.1):

Hypothesis 7: Process management has a positive effect on firm financial performance.

Hypothesis 7a: Process management has a positive effect on quality data and reporting.

It is worth mentioning that the current study investigates quality management as a process, not quality as an outcome of the quality management process. However, quality as an outcome was employed in the current study as an intervening variable in the relationship between quality management and hotel financial performance (see Figure 2.1). An intervening variable is “that factor which theoretically affects the observed phenomenon, but cannot be seen, measured, or manipulated; its effect must be inferred from the effects of the independent and moderator variables on the observed phenomenon” (Cooper and Schindler, 1998:43). Quality can be measured as evidence by previous studies in manufacturing industries such as those studies conducted by Flynn et al. (1995), Forza and Flippini (1998), Prajago and Sohal (2003), Prajago and Brownl (2004), Su et al. (2008), Kaynak (2003), Zu et al. (2008) and Lakhal (2009) and in service industries such as those studies conducted Crompton and MacKay (1989), Luk et al. (1993), Patton et al. (1994), Johns and Tyas (1996), Suh et al. (1997), Ekinci et al. (1998), O'Neill et al. (2000), O'Neill and Palmer (2001), Fu and Parks (2001), Frochot and Hughes (2000), Juwaheer and Ross (2003), Getty and Getty (2003), Atilgan et al. (2003), Juwahee (2004), Nadiri and Hussain (2005), Markovic (2006), Kvist and Klefsjo et al. (2006), Ramsaran-Fowdar (2007), Narayan et al. (2008), Wang et al. (2008), Filiz (2010), and Qin et al. (2010). However, due to the existence of various measures, all associated with limitations, quality is considered as intervening variable in this study.

More specifically, some writers claimed that Garvin's (1984; 1987) criteria of product quality (performance, features, reliability, conformance, durability, serviceability, aesthetics, and perceived quality) are not appropriate to measure quality, particularly, in the manufacturing industries. Therefore, they employed a modified version of Garvin's (1984; 1987) criteria. For example, Flynn et al. (1995) selected some of Garvin's (1984; 1987) criteria and added some other dimensions to measure product quality, such as perceived quality, market outcomes and percentage passed final inspection with no rework, while Forza and Flippini (1998) utilized two variables to measure product quality: quality confirmatory, and customer satisfaction. Likewise, Prajago and Sohal (2006); Prajago and Brownl (2004); Lakhal (2009); and Su et al. (2008) measured product quality by some perceptual variables related to durability, reliability, performance, delivery, tenacity, and conformance to specification. Moreover several writers followed different approaches to measure product quality by using different variables such as cost of scrap and rework as a percentage of sales, productivity and deliver (Kaynak, 2003); cycle time, delivery, customer satisfaction, and cost of scrap and rework as a percentage of sales (Zu et al., 2008) (see column 3 in Appendix 5).

Quality in service industries cannot be objectively measured as it can in manufactured goods and therefore it remains a relatively elusive and abstract concept (Zeithaml et al., 1990; Akbaba, 2006; and Shaikh, 2009). The evaluation of quality performance for services is more complex than for products because of their inherent nature of heterogeneity, inseparability of production and consumption, perishability and intangibility (Frochot and Hughes, 2000). However, several authors (Crompton and MacKay, 1989; Luk et al., 1993; Patton et al., 1994; Johns and Tyas, 1996; Suh et al., 1997; Ekinci et al., 1998; Juwaheer and Ross, 2003; Getty and Getty, 2003; Atilgan et al., 2003; O'Neill and Palmer, 2001 ; Fu and Parks, 2001; O'Neill et al., 2000; Frochot and Hughes, 2000; Getty and Getty, 2003; Juwaheer and Ross, 2003; Juwahee, 2004; Nadiri and Hussain, 2005; Markovic, 2006; Kvist and Klefsjo, 2006; Ramsaran-Fowdar, 2007; Narayan et al., 2008 ; Wang et al., 2008; Filiz, 2010 and Qin et al., 2010) measured quality in service industries using either the service quality (SERVQUAL) scale in its original form (as developed by Parasuraman et al., 1988), or modified the SERVQUAL to reflect some of the unique characteristics of the context of the investigated study or to avoid some of the inherent weakness of the original SERVQUAL scale (Augustyn and Seakhoa-King, 2004) (See Table 2).

In the same context, service quality was described by Parasuraman et al. (1988) as a function of the gap between customer expectations of a service and their perceptions of the actual service delivery by an organization. The SERVQUAL scale is a survey instrument which claims to measure the service quality in any type of service organization based on five dimensions which are reliability, tangibles, assurance, empathy and responsiveness (Parasuraman et al., 1988). Moreover, the originators also contended that "when expected service (ES) is greater than the perceived service (PS), perceived quality is less than satisfactory and will tend towards totally unacceptable quality, with an increased discrepancy between ES and PS; when ES equals PS, perceived quality is satisfactory; when ES is lower than PS, perceived quality is more than satisfactory and will tend toward ideal quality, with increased discrepancy between ES and PS" (Parasuraman et al., 1985: 48–49). This quotation indicates that the scale has been developed to measure the level of customer satisfaction with perceived service quality -from unacceptable to ideal- rather than the level of service quality itself -from low to high- (Augustyn and Seakhoa-King, 2004).

The design of the SERVQUAL scale was based on defining service quality as meeting or exceeding customer expectations (Parasuraman et al., 1985), but defining quality as meeting/ exceeding customer expectations is considered the most complex definition of quality and thus, the most difficult to measure (Reeves and Bednar, 1995) (see defining the study concepts, section 2.1.1). Finally, the SERVQUAL scale claimed to measure the perceived service quality in any type of service organization based on five dimensions, namely tangibles, reliability, assurance, responsiveness and empathy (Parasuraman et al., 1988). However, the application of the SERVQUAL scale frequently yields inconsistent findings in terms of the number and the type of quality dimensions, and it has been noted that the number and the type of quality dimensions vary depending on the service sector investigated (Augustyn and Seakhoa-King, 2004) (see Table 2.1).

Because of this debate about the number of dimensions in the SERVQUAL scale, several writers have modified the original SERVQUAL scale by introducing more dimensions to capture some of the unique features of the service sector investigated (see Table 2.1). As a result many other modified scales to measure service quality in different context have been arisen. This may be due to a lack of a standardized operational definition of service quality (Augustyn and Seakhoa-King, 2004), especially in the hotel industry, where other attributes, such as short distribution channel, imprecise standards, face to face interaction and information exchange, reliability and consistency, and fluctuating demand have been identified and further complicate the task of measuring the service quality performance (Akbaba, 2006).

Table 2-1: Examples of Application of the SERVQUAL Scale in Leisure, Tourism and Hospitality.

Researchers and Year of Study	Object of Evaluation	Comments
Crompton and MacKay (1989)	Recreational services	
Knutson et al. (1991)	Hotels and motels	Modified SERVQUAL scale called LODGSERV (26 items)
Saleh and Ryan (1991)	Hotels	Modified SERVQUAL scale (33 items)
Luk et al. (1993)	Organised tour services	Modified SERVQUAL scale (19 items)
Bojanic and Rosen (1994)	Restaurants	
Getty and Thompson (1994)	Lodging industry	Modified SERVQUAL scale called LODGQUAL
Patton et al. (1994)	Hotels	Application of LODGSERV
Akan (1995)	Hotels	Modified SERVQUAL scale (30 items)
Gabbie and O'Neill (1996, 1997)	Hotels	
Johns and Tyas (1996)	Foodservice outlets	Modified SERVQUAL scale –perceptions only
Ryan and Cliff (1997)	Travel agencies	
Suh et al. (1997)	Hotels	
Ekinci et al. (1998)	Resort hotel	Modified SERVQUAL and LODGSERV scale; (18 items
Wong et al. (1999)	Hotels	
O'Neill et al. (1999)	Surfing event	Modified SERVQUAL scale (21 items)
Ingram and Daskalakis (1999)	Hotels	Modified SERVQUAL scale (27 items)
Frochot and Hughes (2000)	Historic houses	Modified SERVQUAL scale called HISTOQUAL (24 items) perceptions
O'Neill et al. (2000)	Dive tour operator	Modified SERVQUAL scale called DIVEPERF – importance/performance
Fu and Parks (2001)	Restaurants	
O'Neill and Palmer (2001)	Accommodation facilities, water based adventure theme park	Modified SERVQUAL scale – importance/performance
Atilgan et al. (2003))	Tour operators	Modified SERVQUAL scale (26 items)
Getty and Getty (2003)	Lodging industry	Development of new scale based on Parasuraman et al. (1985) ten original dimensions
Juwaheer and Ross (2003)	Hotels	Modified SERVQUAL scale (39-items)
Juwahee, 2004	Hotels	Modified SERVQUAL scale (36-items
Nadiri and Hussain, 2005	Hotels	SERVPERF scale (only two dimension : tangibility (4) and intangibility(18 item)
Markovic, 2006	Tourism higher education	Modified SERVQUAL scale (40-items

Kvist and Klefsjo, 2006	inbound tourism in Sweden	Modified SERVQUAL scale contains 10 dimensions
Ramsaran-Fowdar, 2007	Hotel industry	Modified SERVQUAL scale (58-items)
Narayan et al., 2008	Tourism industry	New scale contains 10 dimension
Wang et al., 2008	Hotels	Modified SERVQUAL scale (35-items)
Filiz, 2010	Travel agents	Modified SERVQUAL scale (26-items)
Qin et al., 2010	fast-food restaurants	SERVQUAL scale +the dimension of recoverability,

Source: Adopted from Augustyn and Seakhoa-King (2004:10-11).

Moreover, the demand for service in the hotel industry is normally clustered around peak periods of the day, week or year, such as check-in and check-out times or holiday season and these peak periods generate an environment which makes it difficult to deliver consistent service quality (Barrington and Olsen, 1987; and Mei et al., 1999).

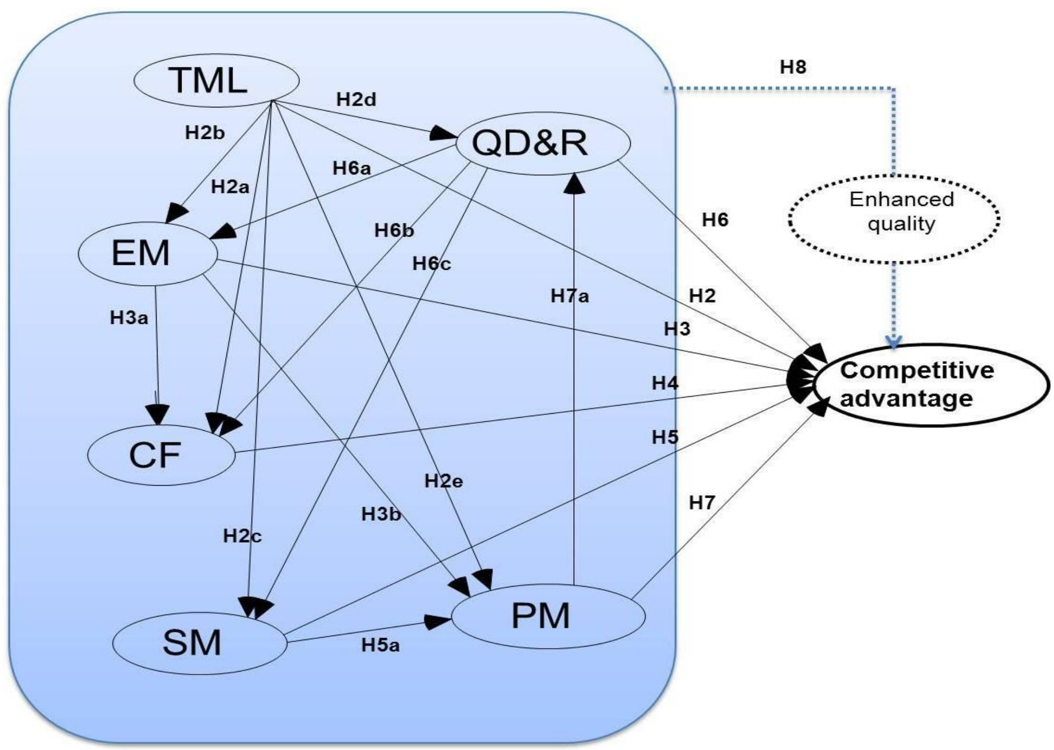
However, developing such an operational definition of service quality is necessary for future research and requires a long-term research and a great deal of effort on the part of researchers (Augustyn and Seakhoa-King, 2004). The previously proposed conceptual definition of quality, addressed in defining the study concepts (Section 2.2.1), may be a step towards developing an operational definition to facilitate measuring service quality in the empirical field.

In the same context, there is a theoretical link between quality performance and business performance, since Porter (1985, 2008) argued that quality can be considered as a part of the differentiation strategy the firm can use to enhance its performance and gain a competitive advantage over its rivals. Hence, bearing in mind the difficulties facing measurement of quality performance (as previously explained) and the theoretical link between quality performance and business performance, QP (quality performance) is held as an unmeasured concept in the current study, that is supposed to intervene in the relationship between quality management and hotel financial performance but its effect can be theoretically inferred from the effect of quality management on the hotel financial performance. In other words, when the hotel financial performance improves, it is assumed that the quality management has improved the quality performance first and then hotel financial performance. Thus the following hypothesis was proposed: (see Figure 2.1).

Hypothesis 8: QMPs have a positive effect on firm financial performance indirectly via quality performance.

Based on the previous discussion, the figure below illustrates the conceptual framework that serves the purpose of the current study which investigates the relationship between QM and CA.

Figure 2-1: The proposed conceptual framework



Source: Author based on Flynn et al. (1995); Powell (1995); Dow et al. (1999); Augustyn and Seakhoa-King (2004); Prajogo and Sohal (2004); Sila and Ebrahimpour (2005); and Zu et al. (2008).

TML: Top Management Leadership; EM: Employee Management; CF: Customer Focus; SM: Supplier Management; QD&R: Quality Data and Reporting; PM: Process Management.

2.5 Summary

This chapter has critically discussed the various definitions of quality management and competitive advantage in order to propose /or adopt valid and reliable definitions to serve the purpose of the current study, which investigates the relationship between QM and CA. Quality management is defined as practices that direct and control an organization in order to achieve "quality", i.e. a situation when a set of inherent characteristics consistently fulfils the continuously changing requirements of the organization's customers and other stakeholders. Competitive advantage is defined as achieving above average performance as compared to the firm competitors in its industry. In addition, previous empirical studies that investigated the relationship between quality management (QM) and competitive advantage (CA), have been reviewed in order to assess their value in generating understanding of the causal relationship between QM and CA. A lack of clarity has been found in three main areas: (1) the dimensional structure of the quality management construct (uni dimensional or multidimensional), (2) which quality management practices generate superior outcomes including CA, and (3) whether the relationship between quality management and CA is direct or indirect. This lack of clarity was found to be due to some methodological limitations such as sampling limitations (i.e. different country /or industry), difference in the dimensions that were used to measure the employed construct, difference in the employed data analysis methods, and according to the ceteris paribus assumption all factors, apart from QM, that affect business performance were held constant in the previous studies, which may explain their contradictory results. Finally, this chapter introduced a conceptual framework to illustrate the direct and indirect relationships between six quality management practices (top management leadership, customers focus, employee management, supplier management, process management, and quality data and reporting) and competitive advantage.

Chapter 3: Research Methodology

3.1 Introduction

In this chapter, the study constructs (quality management and competitive advantage) are operationalized. Additionally, table 3.1 includes the methods that were employed to achieve the current study's objectives is introduced (see Table 3.1). This chapter also provides a detailed discussion of the adopted research design and the data analysis methods that were employed to (1) test the dimensionality of quality management construct, (2) to test which quality management practices generate a competitive advantage, and (3) to test whether the relationship between quality management and competitive advantage is direct or indirect. Table 3.1 illustrates how each objective of the current study was achieved.

Table 3-1: Objectives, Methods of data collection, and Methods of data analysis

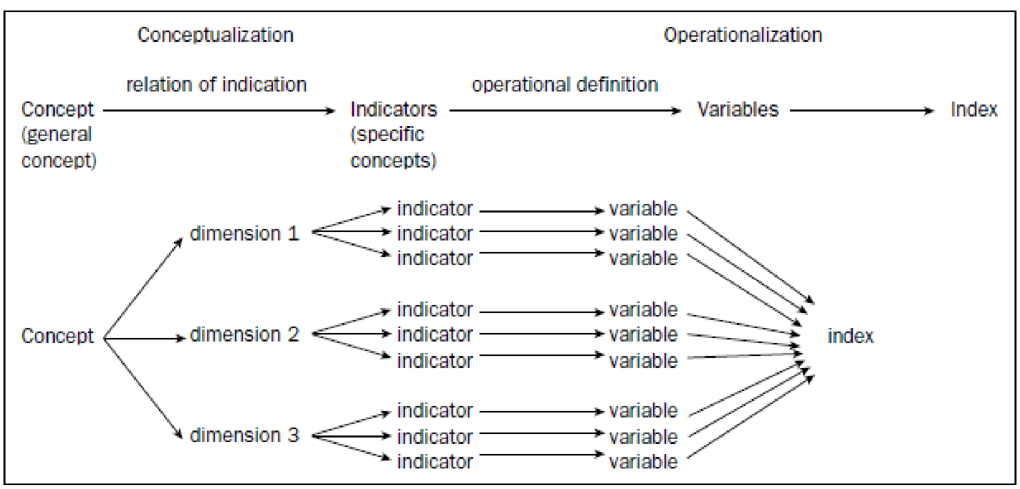
Objectives	Methods of data collection	Methods of data analysis
1- To critically discuss the various conceptual definitions of the current study constructs (quality management and competitive advantage)	**Secondary data (literature search)**	Critical review of the literature
2- To critically evaluate the value of the previous studies in generating our understanding of the relationship between quality management and competitive advantage	**Secondary data (literature search)**	Critical review of the literature
3- To propose a conceptual framework illustrating the relationship between quality management and competitive advantage	**Secondary data (literature search)**	Critical review of the literature
4- To develop operational definitions for the study constructs (quality management and competitive advantage	**Secondary data (literature search)**	Critical review of the literature
5- To test the dimensionality of quality management construct	**Questionnaire**	Confirmatory factor analysis
6- To find out, should quality management construct prove to be multidimensional construct, which quality management practices generate a competitive advantage?	**Questionnaire**	Structural equation modeling
7- To test whether the relationship between quality management and competitive advantage is direct or indirect.	**Questionnaire**	Structural equation modeling
8- To compare the study results (similarities and differences) in relation to the outcomes of previous studies	**Questionnaire**	Structural equation modeling

A literature search was conducted in some of the most comprehensive business database such as ABI/INFOR, Science direct; Business Resource Premium; and Academic Research to critically review the literature in order to achieve objectives 1, 2, 3, and 4 (as previously discussed in Chapter 2 and illustrated in Appendices 1, 2, 3, 4, and 5). Additionally, objective 5 was achieved (the following Section 3.2 discusses it in detail) through analysing the measures of QM and CA which were used in the previous empirical studies published between 1989 – 2011 with a view to identify those QM practices that may have an effect on performance including business performance and competitive advantage.

3.2 Operationalization of the study constructs

According to Bollen (1989); Alston and Bowles (2003); Bryman and Bell (2003) and Corbetta (2003) the process of transforming a concept/construct to be measurable in the empirical field go through several successive steps as shown in Figure 3.1.

Figure 3-1: Schematic representation of the process of empirical transformation of a concept/construct



Source: Corbetta (2003:77)

The first step is to provide a conceptual definition of the study concepts or constructs (Bollen, 1989) and after selecting appropriate definitions of each the next step is to identify their dimensions (Corbetta, 2003). The elements or aspects that go together to make up concepts/constructs are called dimensions (Alston and Bowles, 2003). There may be many dimensions in one concept/construct (Bryman and Bell, 2003). For instance, quality as a single concept may combine eight general dimensions: performance, features, reliability, conformance, durability, serviceability, aesthetics, and perceived quality (Garvin, 1984; Sebastianelli and Tamimi, 2002).

The third stage involves selecting indicators pertaining to each dimension (Corbetta, 2003). Indicators are measurable aspects of dimensions, usually expressed in observable or behavioural terms. Just as there can be many dimensions to a single concept, so there can be many indicators created to measure one dimension (Alston and Bowles, 2003). As one example, the serviceability dimension of the product/service quality can be operationalized into measurable indicators by measuring the time to answer the telephone for reservation or complaint, time to check-in and check – out, availability of staff to provide service, and willingness of staff to provide service quickly. In the third phase, indicators are transformed into variables (Corbetta, 2003). Variables are indicators expressed in measurable terms, with the form of measurement made explicit. Additionally, variables must vary; that is, they must have more than one value or index (Alston and Bowles, 2003). For example, when asking the customer about the time to answer the telephone, this indicator can be measured using a 5-point scale, with (5) being 'very satisfied' and (1) being 'very dissatisfied'. In the same vein, according to Ketokivi and Schroeder (2004) Bryman ad Bell (2003) and Bollen (1989) all measurement instruments must satisfy two basic criteria: reliability and validity; a reliable instrument measures with consistency what was supposed to be measured. In other words, if anyone repeats the measurement used the result will always be the same, while, a valid instrument, in turn, measures what it is theoretically purported to measure.

In the following section, the existing empirical studies that have attempted to measure the current study constructs (quality management and competitive advantage) are critically reviewed according to the previously mentioned steps of operationalizing the study concepts/constructs, in order to find or propose a suitable measurable instrument to serve the purpose of the current study, which investigates the relationship between quality management and competitive advantage.

3.2.1 Quality management operationalization

The first step of the operationalization process was to provide conceptual definitions of the study concepts/ constructs (see Section 2.2). In this respect, quality management as a construct was extensively investigated in the current study and defined as: practices that direct and control an organization with regard to quality. Likewise, quality was defined as: a situation when a set of inherent characteristics consistently fulfils the continuously changing requirements of the organization's customer and other stakeholders. Quality as an outcome was employed in the current study as an intervening variable of the relationship between quality management and competitive advantage (as explained in section 2.3).

After defining the study constructs, the next stage in the operationalization process is to identify the construct's (quality management) dimensions. In this regard, several empirical studies have developed measures of QM practices – which constitute the dimensions of QM- and assessing their reliability and validity in manufacturing and service firms (Saraph et al., 1989; Flynn et al., 1994; Badri et al., 1995; Black and Porter, 1995; Ahire et al., 1996; Grandzol and Gershon, 1998; Quazi and Padibjo, 1998; Quazi et al., 1998; Rao et al., 1999; Curkovic et al., 2000; and Conca et al., 2004).

A literature review of the quality management related studies that were published between 1970 and 1993 by Ahire et al. (1993) produced only 29 empirical studies, giving evidence for a lack of quality management related empirical studies during that period. However, the number of quality management related empirical studies started to increase after 1989 when the critical factors of quality management were first operationalized by Saraph et al. (1989).

To find out the practices which were used in the previous empirical studies to operationalize the construct QM, an extensive investigation of the QM related empirical studies published between 1989 and 2010 (that attempted to measure quality management or linked quality management to operations performance / competitive advantage) was conducted using different keywords such as quality management; quality management practices; strategic quality management; total quality; total quality management; business performance and competitive advantage, in a variety of online databases such as ABI/INFORM Global (Business and management); Business Source Premier; and ScienceDirect:Elsevier Science Journals. All the online databases searched yielded hundreds of articles. Each of these articles was separately examined to make sure that its contents were relevant to the purpose of the current study and that it contained a clear measure of the construct QM. This process yielded 127 empirical studies that were relevant and had a clear measure of QM (see Appendix 6).

Although a plethora of practices have been described in these articles (in total twenty-four QMPs were described in these articles to operationalize the QM construct (see Appendix 6), similarities among quality management practices can be easily discerned. Consequently, to draw out the main quality management practices, a list of QM practices was defined in Appendix 7 and then refined in Table 3.2. This process is conducted by investigating the description of each QM practice, one at a time, and questioning whether it was different from or similar to the practices previously analysed. The similar QMPs were combined together to generate one practice. For example, the indicators which were used to describe "top management commitment" and "leadership" QMPs were found to be very similar, so they were combined into one practice named "top management leadership. Likewise, planning for quality is the responsibility of the top management leadership (Saraph et al., 1989; Juran, 1998); therefore, the indicators which were used to describe "quality planning" QM practices can be re-located under indicators that used to describe "top management leadership" QM practice (see Appendices 6 and 7).

Similarly, because practices such as employee training, employee relations, employee empowerment, employee involvement, teamwork, employee satisfaction and employee appraisal and recognition are employee quality related practices, these practices have been combined into one quality management practice named “employee management”. Moreover, internal/external customer requirements should be fulfilled in the product/service design process (Flood, 1993; Oakland, 2003); supplier capabilities and other stakeholders requirements should also be taken into consideration in the product/service design process (Barrows and Powers, 2009). Consequently, the indicators that were used in the literature review to measure the product/service design QM practice can be re-located under the appropriate related QMPs (customer focus, supplier management, employee management). Finally, continuous improvement and the statistical process control QM practice are part of the process management QM practice (Sila and Ebrahimpour, 2002) (see Appendices 6 and 7).

The previous process of drawing out the main quality management dimensions/factors resulted in six QM (dimensions) which are the most frequently covered QM practices in the previous empirical studies: top management leadership (112), customer focus (107), quality data and reporting (89), employee management (83), supplier management (73) , and process management (59) (see Table 3.2. and Appendices 6 and 7). A continuous scale from 0 to 10 was used to measure how long a QM aspect has been implemented for in a hotel.

After eliciting the six main QM practices from all the QM practices mentioned in Table 3.2 and Appendices 6 and 7, the descriptions (indicators) of these six quality management practices (which were used later in the current study as questions in the survey instrument) had to comply with the principles of questionnaire wording. Although there is no guidance regarding the wording of questionnaire questions, a general principle exists to substantially improve its design (Iarossi, 2006).

Table 3-2: QMPs and their Indicators

QMPs (dimensions/factors)	Description (indicators)
Top management leadership	Acceptance of responsibility by top management to support quality related practices; availability of the necessary resources to carry out the quality management related practices; availability of strategy for the quality planning process[1]; evaluating results by comparing them to planned results.
Customer focus	Frequent contact with customers; use of the customer satisfaction surveys; involvement of customer in the product[2] design process; use of customer complaints; each department is considered an internal customer to other departments.
Quality data & reporting	Availability of quality data (defects and errors rates; control charts); use of quality data; quality data are timely.
Employee management	Provision of training in basic statistical techniques (such as histogram and control charts); training in advanced statistical techniques (such as design of experiments and regression analysis; open employee participation to give quality related suggestions; availability of work environment that encourages employee to perform to the best of their abilities; a monthly meeting for employee from different departments.
Supplier management	Long-term relationships with supplier; small number of high quality supplier; clear specification of the required products; supplier meet certain product quality specifications; supplier capabilities are taken into consideration in the product design process.
Process management	Availability of standardized instruction; use of statistical process control techniques [3] to evaluate processes; availability of statistical techniques to reduce variance in processes; use of preventive maintenance system[4]

1 Quality planning: Systematic process that translates quality policy into measurable objectives and requirements, and lays down a sequence of steps for realizing them within a specified timeframe.

2 Product: goods and services

3 Statistical process control techniques: : Such :Run charts; Pareto charts and analysis; Cause-and-effect diagrams; Frequency histograms Control charts; Process capability studies

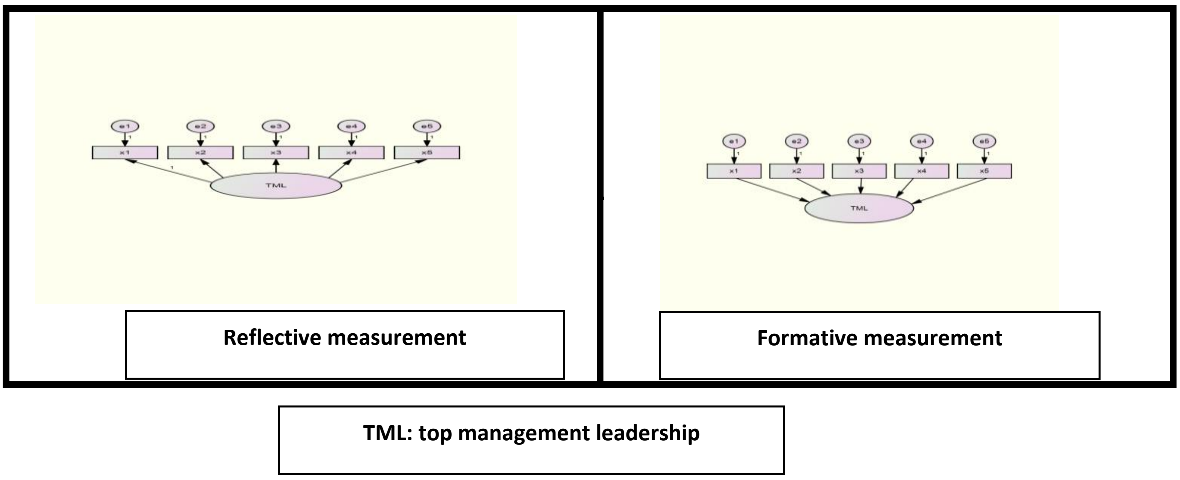
4 Preventive maintenance system: Conducted be the hotel employee to keep equipment working and/or extend the life of the equipment

Source: Author based on Saraph et al. (1989); Flynn (1995); Powell (1995); Ahire et al. (1996); Samson and Terziovski (1999); Lakhal et al. (2009); and Kaynak and Hartley (2008)

In general, questionnaire questions should be kept short, simple, concrete, and specific (Belson, 1986; Iarossi, 2006). It is preferable to avoid: negative words, two questions in one, suggestions or leading questions, broad concepts, and unfamiliar words (Belson1986), loaded questions, sensitive questions, and memory questions (Iarossi, 2006). Taking into consideration these principles, and the context of current study (i.e. hotel industry), the descriptions of the QMPs mentioned in Appendix 7 were modified to suit the purpose of this study (see Table 3.2).

QM was measured in the current study by using six QM dimensions as reflective (effect) indicators. Thus, these QMPs (factors) are seen as functions of the QM construct, whereby changes in the QM are reflected (i.e. manifested) in changes in the observable QMPs indicators. In other words, the QMPs are caused by the existence of the quality management construct and if the organization implements quality management it means that it implements the practices that are employed to measure QM. Figure 3.2 shows the differences in the drawing shape between reflective and formative measurement.

Figure 3-2: Reflective and Formative Measurement



Source: Diamantopoulos (1999)

3.2.2 Competitive advantage operationalization

Several perceptual indicators were used in previous studies to measure the competitive advantage construct, such as fast delivery; flexibility to change; inventory turnover; cycle time, quality improvement and process innovation (Flynn et al., 1995 and Lee and Choi, 2006). Other scholars equated the business performance to competitive advantage and operationalized competitive advantage by using either some perceptual indicators of the business performance such as customer satisfaction, employee morale, productivity, product reliability, workflow improvement and revenue growth (Samson and Terziovski, 1999; Rahman, 2001; Singels et al., 2001; Kaynak, 2003; Hafeez et al., 2006; Prajogo and Sohal, 2006), or by using some objective measures such as return on assets (ROA); return on investment (ROI); market share; growth of stakeholders' equity; return on equity (ROE); and earnings per share (EPS) (Easton and Jarrell, 1998; Agus and Sagir, 2001; Chow-Chua et al., 2003; Wayhan et al., 2002; Douglas and Judge, 2001; Barker and Emery, 2006) (see column 3 in Appendix 5).

According to the adopted definition of competitive advantage (see Section 2.2.3), competitive advantage is not equal to business performance but is attained only when the organization achieves above-average performance as compared to its competitors in the same industry. Hence, the competitive advantage construct was operationalized in the current study through identifying the average performance of all competitors, so that those which achieve above-average performance can be considered as having achieved a competitive advantage.

Return on investment (ROI); return on assets (ROA); and return on equity (ROE) are used in the hotel industry as indicators to measure financial performance (Harrington and akehurts, 1996; Delery and Doty, 1996; Kim and Gu, 2009; Lee and Kim, 2009). However, these measures are difficult to find (Harrington and Akehurts, 1996), and it is impractical to expect busy managers to provide actual performance data, and equally non-viable to use documentary sources such as trade and other publications, for the purposes of obtaining such information (Caruna et al., 1995), especially if this information is not published to public, such as in the Egyptian hotel industry (Ministry of Tourism, 2009).

On the other hand, several obtainable financial measures were found in the literature review, such as gross revenue (as an indicator of performance) (Douglas and Judge, 2001; Agus and Sagir, 2001; Kaynak and Hartley, 2005; Lakhal et al., 2006; Tari et al., 2007) and employee productivity (Samson and Trziovski, 1999; Lau et al., 2004; Kaynak and Hartley, 2005; Rahma and Bollock, 2005). The previous two measures of performance (revenue and employee productivity) are used in the current study as indicators of financial performance. To calculate these two indicators, the average of the hotel total revenue for three years (the time of collecting data was 2009) forward moving (2007, 2008, and 2009) was obtained and then divided by the hotel number of employee to calculate employee productivity and divided by the hotel number of rooms to calculate revenue per room. Those hotels that can obtain above average financial performance (above average employee productivity and or above average revenue per room) can be considered as hotels that have CA over their direct rivals.

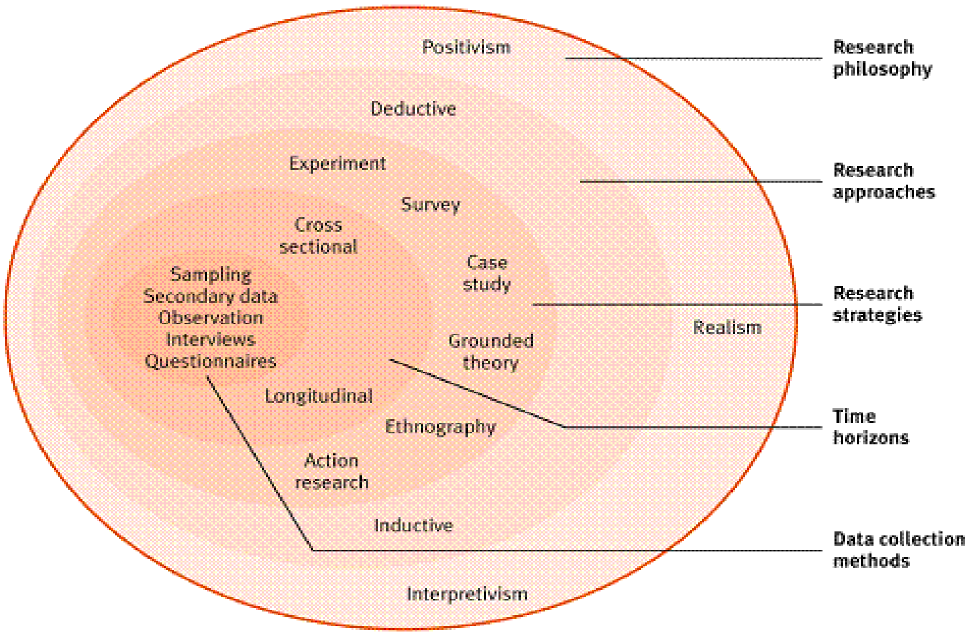
Additionally, in order to identify direct competitors, the hotel star rating system was used to identify the direct competitors as follows: 4 and 5 star hotels were considered direct competitors, as they are supposed to have similar price and quality, similarly 1, 2, and 3 star hotels were considered direct competitors for the same reasons (Ministry of Tourism, 2009).

In the same context, it is worth mentioning here that there are 240000 hotel rooms in Egypt and 240000 still under construction (Egyptian Ministry of Tourism, 2010), which means that there are no barriers to enter the market making the Egyptian hotel industry one of the highly competitive industries (Michael et al., 2011). Hotels industry provides about 12.6% of the total volume of employment in Egypt and generates around 11.5 % of the Egyptian GDP which explains the importance of the hotels industry for the Egyptian economic development (as previously discussed in the section 1.1).

3.3 The Research Design

The research design locates the researcher in the empirical world, and links the research question to data (Punch, 2005). For this research, the first sub-section 3.3.1 deals with the research philosophy, while the second covers the adopted research approach. In the third section, the adopted research strategy is discussed, and the fourth one covers the time horizon of the current study. In the last sub-section 3.3.5, the current study data collection methods are explained. In this study, the methodology is discussed in the light of Saunders, Lewis, and Thornhill's (2003) research process 'onion', in order to develop a methodology which achieves the purpose of the current study. Saunders et al.'s (2003, 83) research process onion is introduced in Figure 3.3, and gives the answers to a sequence of questions regarding the research philosophy, research approach, research strategy, time horizon, and data collection method .

Figure 3-3: The Research Process Onion



Source; Saunders et al. (2003)

Every layer of Saunder's research process onion is briefly illustrated in order to adopt an appropriate research philosophy, approach, strategy, time horizon, and data collection method serve the purpose of the current study.

3.3.1 Research Philosophy

The first layer of Saunders et al.'s (2003) onion refers to the research philosophy. Collis and Hussey (2003: 46) defined the research philosophy as "the progress of scientific practice based on people's philosophies and assumptions about the world and the nature of knowledge". Moreover, the "research philosophy depends on the way that (researchers) think about the development of knowledge" (Saunders et al., 2003: 83).

Saunders et al. (2003) asserted that there are two basic research philosophies named positivism (depending on existing theories) and interpretivism (collecting information to create and build new theory). The adopted research philosophy contains important assumptions about the way in which the researcher views the world (Miller and Brewer, 2003; Walliman, 2006). These assumptions aim to answer the following questions: what is the relationship of the researcher to that researched (epistemology); what is the researcher's point of view on the nature of reality (ontology); what is the role of values (axiology), and how the research process is conducted, deductively or inductively (methodology) (Creswell, 1998; Sarantakos, 2005; Creswell and Clark, 2007; Saunders et al., 2007). Moreover, these assumptions underpin the chosen research strategy and methods (Creswell, 1994). In part, the philosophy adopted is influenced by practical considerations (Miller and Brewer, 2003; Walliman, 2006). However, the main influence is likely to be in the view of the correlation between knowledge and the process by which it is developed (Tashakkori and Teddlie, 1998; Saunders et al., 2007). For example, the researcher who is concerned with facts, such as the resources needed in operational processes, is expected to have a very different view on the way research is conducted from the researcher interested in the feelings and attitudes of the employee towards their managers in that same process. Not only will their strategies and methods possibly differ significantly, but so will their views on what is important and, perhaps more considerably, what is useful (Saunders et al., 2007).

Given the above discussion, the current study adopts the positivist philosophy for the following reasons:

1. This study aims to investigate quality management as a source of competitive advantage. The relationship between quality management and financial performance as an indicator of competitive advantage has been previously investigated in the literature; however, the findings of these empirical studies are ambiguous and even contradictory, which may be a motivator to further testing these relationships and improve our understanding regarding the relationship between QM and CA. Accordingly, the positivist philosophy is more suitable to use in this situation since, this philosophy is used when theory is available, variables can be easily identified and the studies are "highly structured" (Creswell, 1994:10).

2. According to the research objectives, this research tries to study the causal relationship between quality management and competitive advantage. This can be achieved by using the positivist paradigm. Collis and Hussey (2003, 53) contend that "according to positivists paradigm, explanation consists of establishing causal relationships between the variables by establishing causal laws and linking them to a deductive or integrated theory". Moreover, the conceptual framework (proposed in Section 5.4) is to be tested statistically in order to generate more reliable results that can be generalized to the study population. This is consistent with the positivist paradigm (Saunders et al., 2007).

3. The current study investigates the relationship between quality management and competitive advantage from an objective point of view, as it is assumed that this relationship (reality) already exists. This is consistent with the ontological assumption of the positivistic philosophy (Creswell 1994:5; Denzin and Lincoln, 1994:108; and Miller and Brewer, 2003:237).

4. The relationship between quality management and competitive advantage is investigated in the current study apart from the researcher's perceptions of that relationship, to make sure that the researcher would avoid any bias. This is

consistent with the epistemological assumption of the positivistic philosophy (Creswell, 1994:5; Denzin and Lincoln, 1994:108; and Miller and Brewer, 2003:237). Additionally, one might argue that research that reflects the personal biases of its practitioners could not be considered valid and scientific, as it is bound up with the subjectivities of its practitioners. Consequently, in the current study, the researcher's values are kept out of what was researched and from the interpretation of the results. This is consistent with the axiological assumption of the positivistic philosophy (Sarantakos, 2005; Saunders et al., 2007).

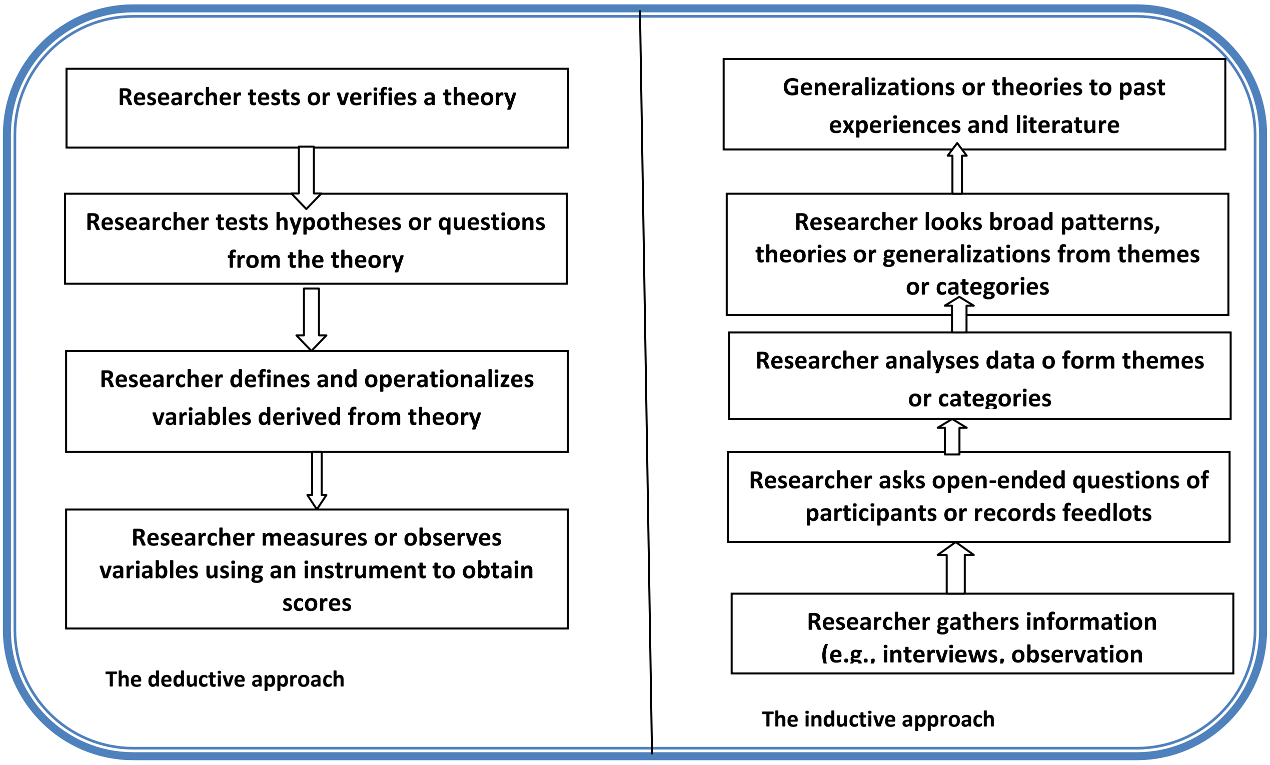
3.3.2 The Research Approach

Research approach is concerned with how the research project will engage the use of theory (Saunders et al., 2007:117). Finn, Elliott-white, and Walton (2000:14) concluded that "Research needs theory as a framework for analysis and interpretation, and theory needs research to constantly review, modified, and challenge theoretical details". In this respect researchers choose the best fit of two different research approaches to their research aims. Generally, there are two research approaches; the deductive approach (testing theory) and the inductive approach (building theory) (Tashakkori and Teddilie, 1998; Miller and Brewer, 2003; Saunders et al., 2007). Each contains basic steps as shown in Figure 3.4.

However, Bryman (2003) noted that there is no completely inductive or deductive approach; both inductive and deductive entail a little part from the other and they can be employed in research reasoning in a sequential manner (Cooper and Schindler, 1998). For example, the inductive approach may follow the deductive approach in a quantitative study (Bryman, 2003). The basic research approach that is used in the current study is the deductive approach. However, inductive reasoning may be adopted in future research if the preliminarily conceptual framework of the study is modified according to the results of the empirical study.

Given the above discussion, the deductive approach was adopted for the following reasons: first, the deductive approach owes more to the positivist philosophy (Saunders et al., 2007) which has been chosen as the current research philosophy.

Figure 3-4: Deductive and inductive approaches



Source: Adapted from Creswell (2003:125-132)

Second, the research hypotheses are derived from the proposed conceptual framework that illustrated the relationship between quality management and competitive advantage. Additionally, quantitative data is collected to test these hypotheses and examine the identified outcomes. Accordingly, these steps in fact fit only the deductive approach (Babbie, 1975; Creswell, 2003; and Saunders et al. 2007). Third; the researcher is independent of what is being researched. Moreover, the "concepts" were "operationalized" (see Section 3.2) in a way that enables variables to be "measured quantitatively" (Saunders et al., 2003, 86). That is consistent with the deductive approach. Fourth, the study depends on a large sample to generalize the findings to the study population, which is consistent with the deductive approach (Saunders et al., 2003:87)

3.3.3 Research Strategy

Research strategy is a “general plan of how the research question(s) will be answered (Saunders et al., 2003:9). Although there are several strategies that can be employed in research, there is no superior research strategy which is better than others. The most important questions are whether a particular strategy fits with the assumptions of the chosen research philosophy or not, and whether it enables the researcher to answer the research questions and achieve the research objectives or not (Saunders et al., 2003).

Bryman and Bell (2003); Creswell (2003); Yin (2003) and Saunders et al. (2007) suggested several research strategies which may belong either to the deductive approach, the inductive approach or to both inductive and deductive, as follows: experiment; survey; case study; action research; grounded theory; and ethnography. An explanation of each strategy and the possible associated research approach they may belong to is provided in Table 3.3.

However, Saunders et al. (2007) asserted that what matters is not the label that is attached to a particular strategy, but whether it is appropriate for the research question(s) and objectives. In this respect, the current study used the survey strategy for the following reasons. First, the survey strategy is generally associated with the deductive approach (Saunders et al., 2007:138). Moreover, it is a “positivistic methodology” (Collis and Hussey, 2003:66). So, the survey strategy is the most suitable strategy for this study, which follows the positivist philosophy as well as the deductive approach.

Second, survey was because it enables the researcher to collect data from a large number of respondents, which serves the purpose of the current study, which aims to investigate the relationship between quality management and competitive advantage in the Egyptian hotel industry.

Table 3-3: Research Strategy and Associated Approach

Strategy	Explanation and its possible associated approach
Experiment	"A classical form of research that owes much to the natural sciences (deductive), although it features strongly in much social science(inductive) research, particularly psychology" (Saunders et al., 2003:91). It will involve typically; definition of hypothesis; selection of samples from the population; allocation of samples to different experimental conditions; introduction of change on one or more of the variables; measurement on a small number of the variable; and control of the variables (Saunders et al., 2003).
Survey	"Usually associated with the deductive approach, allows the collection of a large amount of data from a sizeable population in a highly economic way. Often obtained by using a questionnaire, the data are standardized, allowing easy comparison. In addition, the survey strategy is perceived as authoritative by people in general" (Saunders et al., 2003:92).
Case study	"Seeks to understand a particular phenomenon in its social context". Yin (2003:13) adds that "A Case Study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident". Additionally, there is a tendency to associate case studies with the inductive approach, however such an identification is not appropriate (Bryman and Bell, 2003) , it is definitely true that proponents of the case study strategy often favour inductive methods, such as observation and unstructured interviews, because these methods are viewed as helpful in the generation of an intensive detailed examination of a case, however case study are regularly sites for the employment of both deductive and inductive approaches because almost any type of research can be constructed as a case study (Bryman and Bell, 2003).
Action research	A strategy usually associated with the inductive approach "in which the action researcher and a client collaborate in the diagnosing of a problem and in the development of a solution based on the diagnosis (Bryman and Bell, 2003:567).
Grounded theory	Is often thought of as the best example of the inductive approach, although it is better to think of it as 'theory building through a combination of inductive and deductive approaches" (Saunders et al., 2003). "This strategy often involves the analysis of qualitative data that aims to generate theory out of research data by achieving a close fit between the two" (Bryman and Bell, 2003:570).
Ethnography	**"**firmly rooted in the inductive approach" (Saunders et al., 2003:93) in which " the researcher studies an intact cultural group in a natural setting over a prolonged period of time by collecting, primarily, observational data (Creswell, 2003:14).

Source: Author derived from Creswell (2003); Bryman and Bell (2003); Saunders et al. (2003); and Yin (2003)

This can be achieved by using the survey in where, the "data collected using a survey strategy can be used to suggest possible reasons for particular relationship between variables and to produce models of these relationships" (Saunders et al., 2007:138).

3.3.4 Time Horizon

There are two types of time horizon for doing any study; the snapshot (cross-sectional) and the diary (longitudinal) (Saunders et al., 2003).

The cross-sectional study is a positivistic design to gain information at a single point of time, moreover this type of study is strongly placed in the context of quantitative research (Collis and Hussey, 2003: 61; Bryman and Bell, 2003:51).

Longitudinal study is "a positivistic strategy which involves the study of a variable or group of subjects over a long period of time"(Collis and Hussey, 2003:350).

In light of the above, the current study data was collected using a cross-sectional design (in the hotel industry context) for the following reasons; First, the research does not consider changes or development in the relationship between the study variables but it searches the relationship at a given point-in time. Second, time constraint is another reason to choose cross sectional design, as the researcher has limited time to collect data (Saunders et al., 2003: 96).

3.3.5 Data Collection Methods

Methods of collecting data vary according to the adopted research approach; quantitative or qualitative (Thietart et al., 2001). There are two basic sources of data: secondary data and primary data: *Secondary data*: is "data that already exists such as books, documents and films" (Collis and Hussey, 2003:355). *Primary data*: is "data collected specifically for the research project being undertaken" by the researcher (Saunders et al., 2007:607).

The researcher uses the two methods of data collection. Secondary methods (through searching in several database sources as previously explained and presented in Appendixes 4,5 and 6) were used to conceptualize and operationalize the current study constructs (quality management and competitive advantage) and to investigate previously conducted studies that empirically test the relationship between the current study's constructs (quality management and competitive advantage) in order to develop a conceptual framework to illustrate the relationship between quality management and competitive advantage as (see Section 2.4). Appendices 4, 5 and 6 contain the empirical studies that empirically test the relationship between quality management and competitive advantage.

Regarding primary methods, several methods can be used, depending on the research questions and objectives (Zikmund, 2000; Saunders et al., 2003). For the current study, the data were collected through using a self-administered questionnaire. A questionnaire is "a set of carefully designed questions given inexactly the same form to a group of people in order to collect data about some topic(s) in which the researcher is interested" (Sapsford and Jupp, 2006:252). This method of collecting data is used because it fits the current study philosophy (positivism), and approach (deductive). It is also relevant to the aim of the current study, which investigates the relationship between quality management and competitive advantage through collecting a large amount of data from a sizeable population in a highly economic way (Saunders et al., 2003; Sapsford and Jupp, 2006).

Additionally, by the usage of a questionnaire many advantages could be achieved, such as money saving, time saving, reduction in biasing error, greater anonymity and considered answers and consultations (Cooper and Schilinder,1998; Collis and Hussey, 2003; Saunders et al., 2003 ; Nachmias and Nachmias, 2007), and this fits the current study budget (to save time and money). However, many issues are associated with using a questionnaire, such as questions should be simple; there is no opportunity for probing, no control over who fills out the questionnaire and low response rate (Cooper and Schilinder, 1998; Sapsford and Jupp, 2006; Nachmias and Nachmias, 2007). The low response rate is the most important drawback of questionnaires; the means adopted in the current study to overcome this drawback are explained later in this chapter (see Section 3.4).

3.3.5.1 Questionnaire Design and Administration

Questionnaire questions have to be simple, clear, valid and reliable (Saunders et al., 2003; Zikmund, 2003; Payne and Payne, 2004; Punch, 2005; Neuman, 2006 Nachmias and Nachmias, 2007; and Malhotra, 2010). Zikmund (2003) argued that one of the major decisions in the questionnaire design process is to identify what should be asked; in this respect the questionnaire questions have to be relevant and accurate. Relevant means that no unnecessary information is collected and all required information to solve the research problem is obtained. Accuracy of the questionnaire questions means that the information is valid and reliable. The questionnaire design process is discussed in detail below, while later in this section, the validity and reliability of the current study questionnaire are explained.

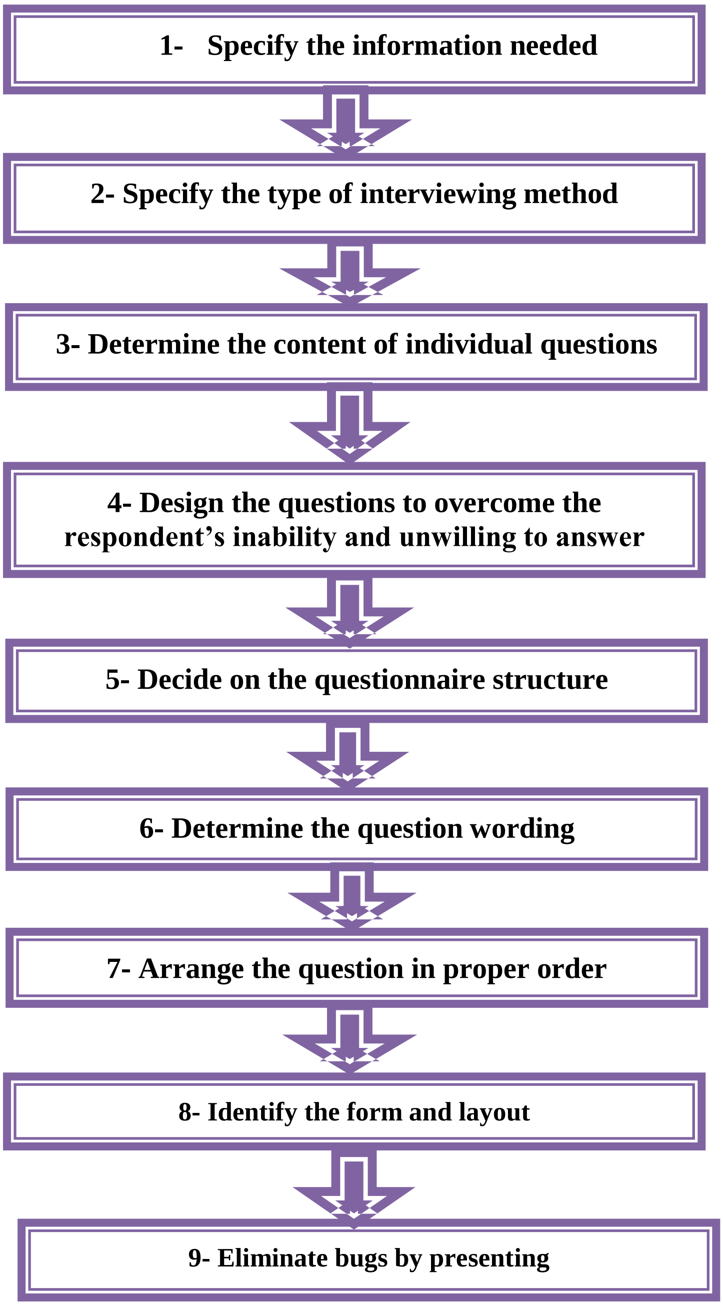
3.3.5.1.1 Questionnaire Design Process

Designing a questionnaire entails a series of logical successive steps (Malhotra, 2010). These steps may slightly vary when carried out by different researchers, however all researchers tend to follow the same general sequence (Neuman, 2006 Nachmias and Nachmias, 2007). Malhotra (2010:336) introduced a clear nine- sequence steps to design a good questionnaire, as shown in Figure 3.5 and discussed below.

1- Specify the Information Needed

The current study aims at investigating the impact of quality management on competitive advantage. In this regard, all the needed information regarding both QM and CA is collected and presented in the literature review chapter in order to achieve the study objectives: (1) to define the current study constructs; (2) to improve our understanding of the relationship between quality management and competitive advantage; (3) to provide a conceptual framework illustrating the relationship between quality management and competitive advantage; and (4) to operationalize quality management and competitive advantage constructs. Additionally, this information enabled the researcher to clearly address the needed questions (items) that should be addressed in the current study measurement instrument (questionnaire).

Figure 3-5: Questionnaire Design Process.



***Source*: Malhotra (2010:336)**

2- Specify the Type of Interviewing Method

Numerous methods can be used to collect data, including personnel interview, telephone interviews, and questionnaires (Zikmund, 2003). An appreciation of how the type of interviewing technique affects the questionnaire design can be illustrated by considering how the questionnaire is administered under each method (Malhotra, 2010).

Personal interview is a face to face, interpersonal role situation in which an interviewer asks respondents questions created to extract answers related to the research hypotheses (Nachmias and Nachmias, 2007). Thus, lengthy, complex, and varied questions can be asked (Malhotra, 2010). In telephone interviews, the respondents interact with the interviewer but cannot see the questions; this limits the type of questions that can be designed to be short and simple ones (Malhotra, 2010).

In a self-administered questionnaire, the questions must be simple and detail instructions must be provided (Malhotra, 2010). Due to time and money constraints and other reasons (see sampling Section 3.3) the current study employed a self-administered questionnaire as the main data collection method.

3- Determine the Content of Individual Questions

Once the information needed is determined and the type of interviewing technique is specified, the next step is to identify the individual question content. Every question in the questionnaire should serve some specific purpose. If there is no satisfactory use for the data resulting from a question, that question should be eliminated (Malhotra, 2010). In the current study only the necessary questions that achieve the aim of the study were employed (see operationalization of the study construct section 3.2).

4- Overcome the Respondent's Inability and Unwilling to Answer

Several factors might limit the respondents' ability to provide the desired information. For example, the respondents may not be informed, or may be unable to remember, or may be unable to articulate a certain type of responses, or the information requested may be sensitive (Malhotra, 2010). Several steps were taken to increase the response rate as discussed later in sampling section 3.3.

5- Decide on the Questionnaire Structure

A question may be unstructured or structured (Malhotra, 2010). Unstructured questions are open ended questions that respondents answer in their own words, while structured questions are closed questions, where the respondent's answer is selected from a number of predetermined alternatives (Collis and Hussey, 2003). Unstructured (open) questions offer the advantage that respondents are able to give their opinion as accurately as possible in their own words, but they can be difficult to analysed (Malhotra, 2010). Additionally, in a questionnaire survey, open questions may discourage busy respondents from answering the questionnaire, while structured (closed) questions are very convenient for collecting factual data and are usually easy to analyse (Collis and Hussey, 2003), and more appropriate to the current study's philosophy (positivism) and approach (deductive) (Saunders et al., 2003; Zikmund, 2003). As a result, closed questions with multi-choice answers were employed in the current study questionnaire.

6- Determine the Question Wording

Question wording is the translation of the desired question content and structure into words that respondents can clearly and easily understand (Malhotra, 2010). In this respect, the current questionnaire's wording was designed by using ordinary words and avoiding using ambiguous, leading or biased questions, and generalization and estimation questions. Furthermore, it was made sure that the questions were simple and full instructions were provided. The questionnaire was translated from its original language (English) to the respondents' native language (Arabic) and then translated back from Arabic to English by some experts in the Egyptian hotel industry (who had experience in the tourism empirical field, tourism academic field and in the Egyptian tourism authority section) and academics in Egyptian tourism and hotel faculties, to make sure that the questions were simple and clear.

7- Arrange the Question in Proper Order

Opening questions should be simple, interesting, and nonthreatening, while difficult or sensitive questions should be placed later in the sequence (Malhotra, 2010). The current study questionnaire contains some simple questions in the first part regarding the hotel classification and location. Information regarding the hotel financial performance is placed just before the optional section at the end of the questionnaire. Optional section contains some information that might be sensitive concerning the participant's name, position and the hotel address.

8- Identify the Form and Layout

The questionnaire should be divided into several parts, each part should be numbered and the questionnaires themselves should be numbered serially (Malhotra, 2010). The current study questionnaire contains a brief introduction regarding the aim of the study and the contact number if there are any concerns about the study and five parts: the first part contains two multiple-choice questions about the hotel classification and location and this part aims at strategically grouping the hotels. The second and third parts contain two questions regarding the quality management aspects adopted in the hotels, while the fourth part contains some questions regarding the financial performance of the hotels, and the final part contains open questions regarding the name, position of the participant and the hotel address, in case the respondents wanted to be informed about the findings of the current study.

9- Eliminate Bugs by Presenting

The initial structure of the questionnaire included 31 items to measure the study constructs (28 to measure QM and 3 to measure CA). In order to purify, identify and eliminate any potential problems of the current study questionnaire, a pilot study was conducted through personal interviews with twenty hotel managers (ten from 5 star hotels and ten from 4 star hotels; 1, 2, 3 star hotel managers refused to participate). The respondents were asked to fill out the questionnaire and, at the same time, comment on its content. Their comments were written down resulted in some changes in content and length of the questionnaire to eliminate some duplicated items. The total items of the final questionnaire were reduced to 24 (22 measuring QM and 2 measuring CA) items. The responses obtained from the pilot study are coded and analysed in Chapter four. The final questionnaire is presented in Appendix 7.

3.3.5.2 Ethical issues

Ethical procedures are adopted to make sure that the research complies with the ethical procedures for research and teaching in Hull University Business School (HUBS). In this context, Punch (2000) stated that all social research entails some ethical issues because the research encompasses collecting data about people and from people. Ethics refers to “the appropriateness of your behaviour in relation to the rights of those who become the subject of your work, or are affected by it" (Saunders et al., 2003:129).

HUBS (2005) suggested a flowchart presented in Appendix 10 to illustrate the ethical obligations which the researcher must be aware of. After the researcher developed his proposal (questionnaire), a proforma (copy of the proposal) should be signed by the researcher and supervisors. Then this proforma and any informed consent letters are sent to the relevant research ethics committee to approve it. In this context, Sekaran (2000) recommendations about the research ethical obligations are adopted as below:

1- The information obtained from the respondents is kept strictly confidential.

2- Researcher does not falsify the nature of the study to respondents, and the purposes are clarified clearly.

3- No one is forced to reply to the survey.

4- There is absolutely no misrepresentation in reporting the data collected during the study.

3.3.5.3 Reliability and validity issues

The following section details how the researcher dealt with reliability and validity

3.3.5.3.1. Reliability

Reliability is the degree to which a measurement instrument is free from error and therefore yields consistent results (Cooper and Schilinder, 1998; Zikmund, 2003; Nachmias and Nachmias, 2007). In other words, reliability concerns the extent to which the measurement is repeatable- by the same person using different measures of the same attribute or by different persons using the same measures of an attribute (Nunnally, 1978). Reliability is a necessary contributor to validity but not a sufficient condition (Nunaly, 1968; Cooper and Schilinder, 1998).

In general, there are three main methods to measure the reliability of a measurement scale: test-retest, parallel forms (equivalent), and internal consistency (Cooper and Schilinder, 1998). The current study measurements were evaluated for reliability by using the Cronbach's alpha, which is an internal consistency method, based on the recommendation of Malhotra (2010). Cronbach's alpha is a technique that calculates the mean reliability coefficient for all possible ways of splitting a set of items into two halves (Malhotra, 2010). High alpha scores mean more internal reliability in the measurement scale whereas a low alpha indicates the items used do not really capture the construct and some items may have to be eliminated to improve the alpha level. However, according to Hair et al (2006), and Nunnally (1978) the lower limit for Cronbach's alpha is 0.70. Bryman and Bell (2003) asserted that the figure 0.080 is typically employed as a rule of thumb to denote an acceptable level of internal reliability.

3.3.5.3.2. Validity

Validity refers to the extent to which the instrument measures what actually intended to be measured (Cooper and Schilinder, 1998; Punch, 1998). In other words, validity is concerned with whether we are measuring the right concept/construct or not. There are three approaches to validation of an instrument: content validity, criterion- related validity and construct validity (Punch, 1998).

Content (face) validity is the extent to which the instrument items provide adequate coverage of all relevant items under study. If the instrument contains a representative sample of all the related items under study then the content validity is good (Cooper and Schilinder, 1998). The current study instrument measure (questionnaire) has a representative collection of items that were previously employed in the literature review to measure the current study constructs (quality management and competitive advantage) from 1989 until 2010. Appendix 6 illustrates the variables that were employed in the previous studies; these variables were modified to serve the purpose of the current study (see operationalization of the study construct section 3.2). Moreover, the questionnaire was reviewed by three experts[4] in the Egyptian hotel industry to make sure that the instrument questions measures what it is intended to measure. Finally, the content validity has been believed to be achieved in the current study, through several techniques as follows.

The questionnaire was tested and revised by the supervisors then, three academic researchers in the faculty of tourism and hotel management, University of Suez Canal, who obtained their PhD from UK and were experienced in the research process, were asked to give their feedback on the employed instrument. Moreover, the questionnaire was piloted with three experts in the Egyptian hotel industry to obtain their suggestions concerning the clarity of the wording, correct use of specific words, ambiguity, consistency of the questions, and overall presentation. Furthermore, the questionnaire was also given to four doctoral students in Business School, University of Hull for their suggestions. Additionally, the questionnaire was distributed to 20 general hotel managers (10 from 4 star hotels and 10 from 5 star hotels) while, personal interviews were held as previously discussed in the questionnaire design process section 3.2.5.1.1.

Criterion- related validity "reflects the success of measures used for prediction or estimations" (Cooper and Schilinder, 1998:168). In other words, criterion validity tests whether the measurement scale performs as expected in relation to other selected variables as meaningful criteria (Hair et al., 2006). According to Cooper and Schilinder

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[4] Experts: Those who have experience in the tourism empirical field; tourism academic field and in the Egyptian tourism authority.

(1998) and Punch (1998) construct validity is the most commonly cited validity assessment in the field of social science. It concerns how the measurement conforms to theoretical expectations (Cooper and Schilinder, 1998; Punch, 1998). It is developed by relating a measuring instrument to a general theoretical framework in order to identify whether the instrument is linked to the concepts and the theoretical assumptions that the researcher is using (Nachmias and Nachmias, 1996). It is significant because it can determine unobservable dimensions of the construct being measured. Construct validity can be divided into two main categories; discriminant and convergent validity (Cooper and Schilinder, 1998). Discriminant validity aims at demonstrating that a measure does not correlate with another measure from which no theoretical relationships are expected (Hair et al., 2006). Convergent validity, on the other hand, is concerned with measuring the degree of a positive relationship among scale items developed to measure the same concept/construct (Nachmias and Nachmias, 2007). The construct validity and its aspects are discussed with confirmatory factor analysis in Section 3.5.2.1.2.

3.4 Sampling

The term sampling refers to "the methods that researchers use to select the groups, objects, or phenomena that they actually observe (Thyer, 2001:41).

3.4.1 The Target Population

"Population is the universe of units from which the sample is to be selected" (Bryman and Bell, 2003:93). The current study target population is 982 general hotel managers in all the Egyptian hotel categories (1, 2, 3, 4, and 5 star) (see Table 3.4). A numeration of the entire population (census) was used in the current study to collect data because the targeted population could not be reduced to select a sample, taking into consideration the low response rate of the questionnaire method (Cooper and Schindler, 1998) (see Table 3.4). However, the findings of the current study can be generalized to a wider population (hotels worldwide) because only 20% of hotels investigated in the current study are independent hotels, while the majority of hotels (80%) are operated by international chains (Egyptian Ministry of Tourism, 2010), which are supposed to have similar policies and headquarter management.

Taking into consideration the usually low response rate of the employed data collection technique (self-administrated questionnaire), several precautionary procedures were taken to increase the response rate of the current study questionnaire as discussed below.

First, to make sure that the respondents are knowledgeable, the current study questionnaire was directed to hotel general managers because general hotel managers have the authority to be aware of the required information (quality management practices adopted and financial data). Furthermore, according to Phillips (1981) and Miller and Roth (1994) higher-ranking informants are more reliable sources of information than their lower level counterparts. Second, to give the respondent time to think about the questions and remember the required answers, the questionnaire was sent by mail/Email or drops – and- collect techniques (explained in depth later in this section). This is consistent with Cooper and Schilinder (1998) who asserted that among the advantages of the mail self-administered questionnaire is that it gives respondents time to think about questions. Third, the questionnaire questions were designed as multiple-choice questions to be simple and clear, and full explanations were provided of any complex concepts, to avoid any problems regarding the articulating of certain types of responses. Fourth, the confidentiality and anonymity of the collected data were clearly assured in the first paragraph of the questionnaire, to encourage the respondents to answer and to avoid any sensitive issues. Additionally sensitive questions such as personal information (name of hotels, respondents, and the hotel address) are avoided in the beginning of the questionnaire and designed to be optional questions at the end of the questionnaire. This is consistent with Sapsford and Jupp (2006), who asserted that if questions which are sensitive appear too early in the measurement instrument this might jeopardize obtaining the required information or even the completion of the questionnaire itself.

Despite the previously mentioned precautionary procedures to increase the response rate, when collecting the required data the questionnaires were distributed in three stages to obtain a good response rate serve the employed data analysis technique (SEM) as discussed below:

Table 3-4: No. of hotels according to the governorate

Category *Governorate*	*5 stars*	*4 stars*	*3 stars*	*2 stars*	*1 star*
Greater Cairo	34	18	47	39	26
Alexandria	11	9	13	21	4
Luxor & Aswan	13	9	22	15	17
South Sinai	56	80	87	43	16
North Sinia	2	0	3	1	0
Red Sea	58	78	88	37	17
Al-Canal	4	8	19	12	2
Upper Egypt	0	3	7	9	12
Lower Egypt	0	1	7	14	20
Total	178	206	293	191	114

Source: Egyptian Ministry of Tourism, 2010

In the first stage of collecting data (15 July 2010) the questionnaires were sent by E-mail to all the Egyptian general hotel managers in Egypt – a comprehensive list of all the hotel E-mail was obtained from the latest official issue (published by the Egyptian Ministry of Tourism) of the official Egyptian hotel guide 2010. Only 15 questionnaires- all of them 5 and 4 star hotels- were obtained from this technique of collecting data, a 1.5 % response rate. This is consistent with what Cooper and Schilinder's (1998) assertion that although, the Email questionnaires are low cost, anonymous and can be expanded to a large geographical coverage, they suffer from a low response rate.

In the next stage of collecting data (1st of August 2010), the questionnaires were sent by first class post and a stamped-return envelope was provided to increase the response rate. Mail questionnaires have several advantages, such as being perceived as more anonymous, allowing respondents time to think about question and allowing contact with otherwise inaccessible respondents but they still suffer from a low response rate (Cooper and Schindler, 1998). Only 20 questionnaires (all of them from 5 and 4 star hotels) were obtained from this technique of data collection, which represents a 2 % response rate.

In the third stage of collecting data (20th of August until 10th of October 2010), a different approach was adopted to increase the response rate through the drop –and-collect survey (DCS) method. As the name implies, the DCS method involves the researcher(s) personally delivering – and later collecting – the survey instrument (the questionnaire), either directly to the target respondents or indirectly via a gatekeeper (e.g. a secretary). Ibeh and Brock (2004) provided empirical evidence that the DCS method raises the response rate better than the mail and email methods. Additionally, the literature attributes to the method markedly higher response rates, e.g. 50–70% (Lovelock et al. 1976) and 77% (Brown 1987).

Because it was not practical to drop the questionnaire to the 982 general hotels managers in Egypt and then collect them later, due to time and money constraints, a crucial decision was made to avoid dropping the questionnaire to 1,2,3 star hotels general managers. These categories of hotels were excluded because, as explained before, some of them refused to participate in the pilot study. Additionally, they had received two opportunities to response through Email and mail questionnaires but no responses were obtained from them. Additionally some experts in the Egyptian hotel industry declared in personal communication that these categories of hotel may refuse to respond to the current study questionnaire, which investigates the relationship between quality management and competitive advantage, because they might not be interested in quality management practices bur rather utilize different strategies to gain a competitive advantage through adopting the low cost strategy. This is consistent with what Porter (1985) who stated, that in cost leadership strategy, the firm main target is to be the low-cost producer in an industry to gain a competitive advantage over its direct rivals. Those companies who have a reputation as a lower cost leader companies may also lead to a reputation of low quality, because for those companies cost is the basis for everything in the supply chain process not quality (Baack and Boggs, 2008), therefore attaining quality through quality management is unlikely to happen if a low cost strategy is pursued.

As a result, the decision was taken to focus only on all the 4 and 5 star general hotel managers. A total of 300 questionnaires (out of 384 four and five star hotels) were obtained, of which 12 questionnaires were excluded due to an excessive number of unanswered questions, leaving a final usable total of 288, yielding a response rate of 75%.

3.5 Data Analysis Techniques

The quantitative data was analysed through successive stages of analysis: preliminary analysis (screening data prior to analysis), descriptive analysis, and multivariate analysis. Preliminary analysis (aims at establishing/testing necessary conditions prior to multivariate analysis) investigated some issues such as addressing missing data, dealing with outliers, test of normality, multicollinearity, singularity, linearity, and homoscedasticity. Preliminary analysis also included sample size and sample bias to measure the differences between groups or variables (e.g. T-test). The next stage was concerned with some descriptive analysis, which included some central tendency measures; variability (dispersion) measures; and some information concerning the distribution of scores (as discussed in the next section 3.5.1). Furthermore, multivariate analyses such as reliability, factor analysis were employed to test the scale reliability, validity and dimensionality. Additionally, structural equation modelling was used to investigate the direct and indirect effects between the variables of the study's proposed model. The following section explains in-depth the descriptive analysis methods and discusses as well the multivariate analysis techniques employed in the current study; exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and structural equation modelling (SEM). The results of these data analysis methods are presented in the next chapter.

3.5.1 Descriptive Analysis

Descriptive statistics have a number of uses: first, to explain the characteristics of the sample; second to test the variables for any violation of the assumptions underlying the statistical methods that were employed to address the research questions (Pallant, 2007). These descriptive statistics include central tendency measures such as mean, median, and mode; variability (dispersion) measures such as standard deviation, range of scores, and some information concerning the distribution of scores (skewness and kurtosis) (Field, 2006; Tabachnick and Fidell, 2007; Stevens, 2009). Each of these measures is briefly explained below:

Mean: the sum of the measurements divided by their number, it is the most frequently used method to find the accurate average of a set of data. However, as the only measure of central tendency that uses all the data values in a sample or population, the mean has one great weakness as it influenced by extreme values (outliers) (Levine and Stephan, 2009).

Median: the middle value when the values are arranged from smallest (minimum) to largest (maximum). The median splits the data values into two equal halves. Extreme values (outliers) do not affect the median, making the median a good alternative to the mean. However, if the gap between some values is large, while it is small between other values in the data, this can cause the median to be a very inaccurate method to find the middle of a set of data (Panik, 2005)

Mode: The value (or values) in a set of data values that appears most frequently. However, it could be very far from the actual middle of the data (Levine and Stephan, 2009).

Range: The difference between the largest (maximum) and smallest (minimum) data values in a set of data values. The range (as a dispersion measure) is easy to be computed, easy to understand, its scores exist in the data set, but its value depends only on two scores, and it is very sensitive to outliers (very high or very low values) (Panik, 2005) .

The Standard Deviation is a value that measures how far away each value in a set of data is from their mean, where a large standard deviation indicates that the data points are spread far from the mean and a small standard deviation indicates that they are clustered closely around the mean. If all the data values are equal, then the standard deviation is zero. Standard deviation is the most frequently used method to measure variability (dispersion) of a set of data as it gives a good picture of how the data is spread around, but it is still influenced by extreme scores (outliers) (Bryman and Cramer, 2005).

Descriptive statistics also provide some information concerning the distribution of scores (skewness and kurtosis). Skewness gives an indication of the symmetry of the distribution; a skewed variable is a variable whose mean is not in the middle of the distribution, while Kurtosis, on the other hand, provides information about the peakedness of a distribution; a distribution can be too peaked (will show short, thick tails) or too flat (will show long, thin tails) (Stevens, 2009; Tabachnick and Fidell, 2007, Field, 2006). Positive skewness values show positive skew where the scores clustered to the left - hand side of the graph, while negative skewness values on the other hand show a clustering of scores at the right-hand side of a graph (Pallant, 2007).

The values of skewness and kurtosis should be 0 in normal distribution of data, where the further the value of the variable is from 0, the more likely the data are not normally distributed, additionally its value has its related standard error (Tabachnick and Fidell, 2007). However, the values of the skewness and kurtosis are not in themselves formative but have to be converted to *z* score values to standardize them so any scores that were originally measured in different units can be compared (Tabachnick and Fidell, 2007). *z* score can be calculated by dividing the values of the skewness and kurtosis by its correlated standard error as below :

$$Z \text{ skewness} = \frac{S - 0}{SE \text{ skewness}}$$

$$Z \text{ kurtosis} = \frac{k - 0}{ke \text{ skewness}}$$

If the yielded *z* value is ± 1.65 means that it is accepted at a significant level of 90% (P <.1); ± 1.96 means that it is accepted at a significant level of 95% (P <.05); ± 2.58 is accepted at a significant level of 99% (P <.01); and ± 3.29 is accepted at a significant level of 99.9% (P<.001) (Field, 2006). However, these tests are very sensitive to large sample size (N more than 200) and it is recommended to inspect the shape of the distribution (e.g. using a histogram, and Normal Q-Q Plot,) and visually look at the values of skewness and kurtosis statistics rather than calculate their significant (Field, 2006; Pallant 2007; Stevens, 2009; and Tabachnick and Fidell, 2007) .

The shapes of normality distribution were obtained in the current study from the SPSS package through running the Explore option of the Descriptive Statistics menu.

3.5.2 Multivariate Analysis Methods

The current study employed factor analysis (exploratory factor analysis EFA, and confirmatory factor analysis CFA), and structural equation modelling (SEM) in order to investigate the dimensional structure of the quality management construct and the direct and indirect effects of quality management on competitive advantage.

3.5.2.1 Factor Analysis

When a theory exists about an underlying structure or when the researcher aims at understand an underlying structure, factor analysis is often employed (Tabachnick and Fidell, 2007). In this case, scholars believe that responses for various different questions were driven by just a few underlying structures named factors. There are two types of factor analysis: exploratory factor analysis and confirmatory factor analysis (Hair et al., 2006; Pallant, 2007; Tabachnick and Fidell, 2007). Exploratory factor analysis is a statistical approach that can be used to achieve two main results; data summarising and data reduction (Tabachnick and Fidell, 2007; Hair et al., 2006). Data summarising aims to locate appropriate structure of the research variables under the specific logic factors

(Tabachnick and Fidell, 2007; Hair et al., 2006). Data reduction is a process used to remove uncorrelated items and reduces the number of items within each variable (Tabachnick and Fidell, 2007; Pallant, 2007). Confirmatory factor analysis (CFA), on the other hand, provides a precise method to test the dimensionality and validity of the measurements (Gerbing and Anderson, 1988; Tellefsen and Thomas, 2005; Hair et al., 2006). These two types of factor analysis were employed in the current study. In the following section, EFA and CFA are discussed in details, while their results are later presented in chapter four:

3.5.2.1.1 Exploratory factor analysis

The aim of EFA in the current study was data reduction of the entire sample (to purify the scale) and to ascertain whether the survey questions loaded on their respective dimensions (this was refined and confirmed later by CFA). Pallant (2007) identified three basic phases in conducting exploratory factor analysis as follows:

Step 1: Conditions Necessary for EFA

There are a number of issues that were considered in using exploratory factor analysis (these issues are necessary conditions for most multivariate analysis techniques). Those issues are related to sample size, factorability of R (strength of the relationship among the variables), missing data, outliers, linearity, normality, multicollinearity and homoscedasticity (Tabachnick and Fidell, 2007; Pallant, 2007).

The first issue is concerned with assessing the adequacy of the sample size for exploratory factor analysis. There is no agreement among scholars regarding how large a sample should be; the recommendation generally is: the larger, the better (Tabachnick and Fidell, 2007; Hair et al., 2006; and Pallant, 2007). In a small sample, the correlation coefficients between the variables are less reliable, tending to vary from sample to sample. Moreover, factors obtained from small data sets cannot be generalised as well as those derived from larger samples (Pallant, 2007). Tabachnick and Fidell (2007:613) concluded that “it is comforting to have at least 300 cases for factor analysis”. However, a smaller sample size (e.g. 150 cases) should be sufficient if high loading marker variables exist (above 0.80). Some authors suggest that it is not the overall sample size that is of concern, but the ratio of cases to items (Pallant, 2007). Nunnally (1978) recommends a 10 to 1 ratio; that is, ten cases for each item to be factor analysed. Others suggest that five cases for each item are adequate in most cases (Hair et al., 2006). The current study contains 22 indicators (items) measuring six main constructs; therefore, sample size of 288 can be considered appropriate sample size for EFA.

The second issue concerns the factorability of R (strength of the inter-correlations among the items). Tabachnick and Fidell (2007) suggest an inspection of the correlation matrix for evidence of coefficients greater than 0.3. If few correlations above this level exist, factor analysis may not be suitable. Two statistical methods are also provided by the SPSS package to test the factorability of the data set: Bartlett's test of sphericity (Bartlett 1954), and the KaiserMeyer- Olkin (KMO) measure of sampling adequacy (Kaiser 1970, 1974). Bartlett's test of Sphericity should be significant *(*$P < 0.05$) for the factor analysis to be appropriate. The KMO index ranges from 0 to1 with 0.6 suggested as the minimum value for a good factor analysis (Tabachnick and Fidell 2007). These conditions to conduct EFA were met (the results are discussed in details in section 4.4.1).

The next issue concerns with missing data. Missing data is "information not available for a subject (or a case) about whom other information is available; it often occurs when a respondent fails to answer one or more question in a survey " (Hair et al., 2006:34). Missing data can generate difficulties in data analysis and can have dramatic effects on the research results. It can occur randomly or in some systematic pattern (e.g. lots of respondents refuse give answers about income and women failing to answer the question about their age) (Pallant, 2007).

The options button in SPSS statistical procedures gives three choices for how to deal with missing data: (1) Exclude cases listwise: this option includes cases in the analysis only if full data on all variables exist; (2) Exclude cases pairwise: this option excludes the case only if it is missing the data that is required for a specific analysis; it still will be included in any analyses for which it has the required information; (3) Replace with mean: this option will calculate the mean value of the variable and gives every missing case this value (Pallant, 2007). However, in the current study only a few data points, about, 5% or less, are missing in a random pattern. Therefore, the problems that associated with missing data are less serious and almost any procedure for handling missing values yields similar results (Tabachnick and Fidell, 2007). In this study 12 uncompleted questionnaires were excluded due to an extreme number of unanswered questions and then both exclude cases listwise and excludes cases pairwise methods were separately used to deal with any missing values and the result in both cases was zero per cent (see Section 4.4.1).

Regarding the outliers, an outlier is a case with such an extreme value on one variable (a univariate outlier) or such a strange combination of scores on two or more variables (multivariate outlier) that it distorts statistics (Tabachnick and Fidell, 2007:72).

According to Hair et al. (2006), there are four main reasons for the existence of an outlier in the research sample. First: derived from incorrect data entry. Cases that are extremely high or low should be checked carefully to make sure that data are correctly entered. Second: derived from extraordinary events which explain the uniqueness of the observation; the decision to delete or retain this type of outlier depends on whether it matches with the research objectives or not. Third; derived from extraordinary events which are unexplained by the researcher; the decision to delete or retain this type of outlier depends on the researcher's judgment. The fourth and final class of outliers contains observations that fall within the ordinary range of values in each variable; these observations are not particularly high or low but are unique in their combination of values across the variables. In that case the observation should be retained unless certain evidence is available that discounts the outlier as a valid member of the population.

The boxplot in SPSS package can be used to detect outliers -Cases that are extremely high or low- (Tabachnick and Fidell, 2007). Any values that SPSS considers as outliers emerge as little circles with an attached number (Pallant, 2007) (Dealing with outlier in the current study is discussed in section 4.4.1).

The next issue concerns with linearity of the relationship between dependent and independent variables, which represents the degree to which change in the dependent variable is associated with the independent variable (Hair et al., 2006:205). In other words, the relationship between the two variables should be linear. This means that when one looks at a scatterplot of scores a straight line (roughly) should be seen, not a curve (Pallant, 2007). Linearity is vital in a practical sense because Pearson's r basically captures the linear relationships among variables; if there are significant nonlinear relationships among variables, they should be ignored (Tabachnick and Fidell, 2007). Linearity can be examined by scatterplots or by the correlation coefficient (e.g. Pearson r) (Pallant, 2007) (The results of these both methods of testing linearity are presented in section 4.4.1).

Regarding the normality issue, normality is used to "describe a symmetrical, bell-shaped curve, which has the greatest frequency of scores in the middle, with smaller frequencies towards the extremes (Pallant, 2007:57). Univariate normality for the individual variables can be tested by reviewing the graphs such as histogram, and normal probability plots (Hair et al., 2006; Tabachnick and Fidell, 2007; Pallant, 2007). Frequency histograms can also be used for assessing normality, particularly with the normal distribution as an overlay (Griffith, 2010). It there is regularly a pileup of values near the mean with values trailing away in either direction, univariate normality of the variable would be met (Tabachnick and Fidell, 2007). Normal probability plots (Normal Q-Q plots) can also be used (Tabachnick and Fidell, 2007). In Normal Q-Q plots, the scores are sorted and ranked and then an expected normal value is calculated and compared for each case with the actual normal value. In a Normal Q-Q Plot, the observed value for each single score is plotted against the expected value from the normal distribution; a reasonably straight line implies a normal distribution (Pallant, 2007). It is claimed that the negative effect of non-normality can be serious in small sample size (less than 50 cases), while with a larger sample size (the current study sample size is 288) the negative effect of non-normality may be negligible (Tabachnick and Fidell, 2007; and Hair et al., 2006).

In this study, the shapes of the distribution (e.g. using a histogram, and Normal Q-Q Plot) are inspected for normality, while the of skewness and kurtosis values are visually inspected rather than calculate their significance as recommended by Field (2006); Pallant (2007); Stevens (2009); and Tabachnick and Fidell (2007) (see Section 4.3.2).

The final issues are regarding multicollinerity and homoscedasticity. Multicollinearity occurs when the independent variables are highly correlated (r=.9 and above), while homoscedasticity reflects the presence of equal variances, where, the variability in scores for variable X should be similar at all values of variable Y. This can be ascertained through checking the scatterplot where a fairly even cigar shapes should be shown (Pallant, 2007). It is important because the variance of the dependent variables should be equally dispersed across the range of the independent values to allow a fair analysis of the relationship across all values (Hair et al., 2006). The existence of multicollinearity or homoscedasticity will not contribute to a good research model (Pallant, 2007) (The correlations between the current study constructs are presented in the SEM output Tables 4.21).

Step 2: Factor extraction

Factor extraction involves determining the smallest number of factors which can be extracted to best represent the interrelations among the set of variables (Pallant, 2007). There are a variety of procedures for factor extraction, such as principal components, principal factors, maximum likelihood factoring, image factoring, alpha factoring, and unweighted and generalised (weighted) least squares factoring (Field, 2006; Hair *et al.*, 2006; Tabachnic and Fidell, 2007). Principal components and principal factors are the most commonly used approaches (Hair et al., 2006; and Tabachnic and Fidell, 2007) Principal components is used when the objective is to summarise most of the original information (variance) in the minimum number of factors for prediction purposes, whereas principal factors is used primarily to identify underlying factors or dimensions that reflect what the variables share in common (Field, 2006; Hair et al., 2006; Tabachnic and Fidell, 2007).

It is up to the researcher to decide the number of factors that is thought best describes the underlying correlation among the variables. This entails balancing two conflicting needs: the need to find a simple solution with as few factors as possible; and the need to explain as much of the variance in the original data set as possible (Pallant, 2007). Tabachnick and Fidell (2007) suggest adopting an exploratory approach, experimenting with different numbers of factors until a satisfactory solution is found.

Several techniques were tested in this study to assist in the decision regarding the number of factors to maintain including communalities: Kaiser's criterion (eigenvalue rule), percentage of variance, and scree plot (Tabachnick and Fidell, 2007; Pallant, 2007; and Hair et al., 2006).

Kaiser's criterion or eigenvalue rule is one of the most frequently used techniques in EFA. Using this rule, only factors with an eigenvalue of 1.0 or more can be retained for further investigation (Pallant, 2007). The eigenvalue of a factor represents the amount of the total variance explained by that factor. Moreover using eigenvalue for establishing a cut-off is most reliable when the number of variables is between 20 and 50 (Hair et al., 2006). Communality is a measure of the correlations between an original variable and all other variables in the analysis (Field, 2006; Hair et al., 2006). Communality values can range from 0 to 1, where 0 indicates that the common variance factors explain none of the variance, and 1 indicates that all the variance is explained by the common factors (Hair et al., 2006). Moreover, the percentage of variance criterion is a technique based on achieving a specified cumulative percentage of total variance extracted by successive factors (Hair et al., 2006). In natural science, 95% of the total cumulative variances represent a satisfactory threshold to accept an EFA solution. In contrast, in social science where information is often less precise, the satisfactory cut-off point is 60% or less (Hair *et al.*, 2006). Another approach that can be used is Catell's scree test (Catell, 1966). This entails plotting every one of the eigenvalues of the factors and checking the plot to locate a point at which the shape of the curve changes path and becomes horizontal (Tabachnick and Fidell, 2007; Pallant, 2007 ; and Hair *et al.*, 2006). Catell (1966) recommended maintaining all factors above the elbow, or break in the plot, as these factors contribute the most to the justification of the variance in the analysed data set (see Section 4.4.1).

Step 3: Factor Rotation and Interpretation

Once the number of factors has been identified, the next stage is to interpret them. To assist in this process, the factors are rotated (Pallant, 2007). This rotation does not change the underlying explanation, but presents the pattern of loadings in a way that is easier to be interpreted (Tabachnick and Fidell, 2007). SPSS does not name or interpret these factors per se but it gathers all variables that are correlated together (Hair et al., 2006).

There are two main approaches of rotation, either orthogonal (uncorrelated) or oblique (correlated) (Tabachnick and Fidell, 2007; Pallant, 2007; and Hair et al., 2006). Orthogonal rotation results in solutions that are easier to be interpreted and reported; however, they do need to assume (usually incorrectly) that the underlying constructs are independent of each other (not correlated). The oblique approaches let the factors be correlated, but are more difficult to be interpreted and report (Tabachnick & Fidell 2007). In practice, the two approaches (orthogonal and oblique) frequently produce similar results, especially when the pattern of association among the items is clear (Tabachnick and Fidell 2007; Pallant, 2007). Several researchers perform both orthogonal and oblique rotations and then report the clearest and easiest to interpret. Within the two broad categories of rotational approaches there are a number of different rotational techniques provided by SPSS (orthogonal: Varimax, Quartimax, Equamax; oblique: Direct Oblimin, Promax). As recommended by Tabachnick and Fidell (2007); Pallant (2007); and Hair et al. (2006), the current study employed the most commonly used orthogonal approach, the Varimax method, which aims to minimise the number of variables that have high loadings on each single factor. Comfrey (1973) suggested useful guidelines for this purpose where any loadings greater than ± 0.71 is excellent, ± 0.63 is very good, ± 0.55 is good, ± 0.45 is fair, and ± 0.32 is poor. In this study, loading below 0.6 was ignored, because higher loading provides a clearer guide to what the factor is measuring (Rees, 1996).

3.5.2.1.2 Confirmatory Factor Analysis

Confirmatory factor analysis (often performed through structural equation modelling) is a much more sophisticated technique usually used in the advanced stages of the research process to test a theory about latent processes (Tabachnick and Fidell, 2007). Confirmatory factor analysis was employed in the current study to achieve two main objectives: to test the (a) dimensionality and (b) validity of the measurements (Gerbing and Anderson, 1988; Tellefsen and Thomas, 2005; Hair et al., 2006).

(a): Testing the dimensional structure of the measurement

In developing measures, constructs can be employed as uni-dimensional or multidimensional (Hair et al., 2006). Uni-dimensional means "that a set of measured variables (indicators) has only one underlying construct" (Hair et al., 2006:781). It means (in SEM) that measured indicators (variables) should be hypothesized to relate to only a single factor (construct) and all cross loading are hypothesized to be zero (Byrne, 2006). Additionally, the covariance among error of any two measured variables should be fixed to zero under the uni-dimensionality assumption (Hair et al., 2006). Multidimensional measures means that the construct is measured by several distinct but related dimensions where each dimension can be measured be several distinct indicators (Gerbing and Anderson, 1988; Byrne, 2006; Hair et al., 2006).

Several statistical techniques have been used to analyse the dimensional properties of measures, such as coefficient alpha, and exploratory factor analysis. However, it is widely accepted that coefficient alpha is not an appropriate technique to test dimensionality, but it was used for that purpose in several studies (Rubio et al., 2001). The limitations of these statistical techniques are discussed below, followed by in depth discussion about testing the dimensional structure of the measurement through CFA.

Coefficient alpha can be used to test internal consistency (reliability) in which, if two items are used to measure one construct, the item-to-item correlation should be high (Cooper and Schilinder, 1998). However, Coefficient alpha -as a test of internal consistency- is a necessary but not sufficient for testing dimensionality (Anderson and Gerbing, 1982). Additionally, items can be reasonably correlated and multidimensional as well (Cortina, 1993). Uni-dimensionality is not equivalent to reliability (Rubio et al., 2001); adding items to the measure can improve its reliability despite the dimensionality of the measure (Gerbing and Anderson, 1988; Nunnally and Bernstein, 1994). In other words, an acceptable coefficient alpha can be achieved, even with the dimensionality of the measure (Rubio et al., 2001).

Exploratory factor analysis (EFA) has long been employed to test the structure of the measurement items (Rubio et al., 2001). EFA can identify the number of factors present in a specific scale as well as the items that weight most highly onto each factor (Field, 2006; Hair et al., 2006; Tabachnick and Fidell, 2007; Pallant, 2007). However, even when a construct is uni-dimensional, there may be several factors, composed of many items, which define the construct; in other words, the number of factors that measure a specific construct does not test dimensionality (Rubio et al., 2001). Hunter and Gerbing (1982:273) concluded that “EFA is a poor ending point for the construction of a uni-dimensional scale”. Although, EFA combines the highly correlated items into the same construct (Pallant, 2007), variables might be correlated for several reasons, besides being measures of the same factor (Rubio et al., 2001). The extraction and rotation methods in EFA give it more flexibility; a rotation method such as *direct oblimin* in SPSS lets the factor be correlated (Tabachnick and Fidell, 2007). Two possible reasons exist to explain the correlation of factors, each of which leads to different conclusions: the factors might be measuring a higher order factor, which assumes that the factors are measures of one dimension of another construct; the second explanation for the factor correlation might be a result of the factor representing different dimensions of a construct (Rubio et al., 2001). In SPSS the factors (after the EFA test) are frequently used as variables by generating composite scores with the items that are supposed to measure each construct (Field, 2006; Hair et al., 2006). However, a “composite score is meaningful only if each of the measures is acceptable uni-dimensional” (Gerbing and Anderson, 1988:186). Finally, if the researcher does not test the multidimensional nature of the measure (that is, measuring more than one dimension of the construct), problems can occur and the estimates for the scale will be inaccurate and can cause erroneous conclusions about the measure (Rubio et al., 2001).

Given the limitations of using coefficient alpha and exploratory factor analysis to test the dimensionality of the measures outlined in the previous paragraphs, confirmatory factor analysis can be employed to test the dimensional structure of the measure (Byrne, 2010). Researcher can conduct CFA (through SEM) to build several models to assess the properties and the factorial structural of the scale (Byrne, 2010). As a statistical technique for testing relations between latent[5] and measured[6] variables (Byrne, 2010; Hair et al., 2006; Kline, 2011), scholars can conduct confirmatory factor analysis (CFA) as well as assess the validity of the measures (Byrne, 2010; and Hair et al., 2006). In CFA, several options (models) can be created to test dimensionality of the measure such as (1) all the study indicators might be tested to find out if they can be employed to measure only one construct (one factor model); (2) all the factors might be allowed to be freely correlated (oblique factor model); or (3) they may be correlated because they all measure one higher-order construct (higher order factor model) (Byrne, 2010). Without testing these three models, the researcher cannot assume that the significant correlation is a result of factors measuring the same construct (Rubio et al., 2001). These three options (models) are tested in this study (see Section 4.4.2.1) to find out the dimensional structure of quality management construct.

(2): Testing the validity of the measurement

CFA can be used to test the factor loadings of each observed variable on the latent variable (Byrne, 2010). This permits the assessment of constructs in terms of convergent validity and discriminant validity (Hair et al., 2006; Kline, 2011). Convergent and discriminant validity are explained below:

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[5] Latent variable: variable that cannot directly observable or be measured (Kline, 2011).
[6] Measured (observed) variables: a set of variables that can be used to define or infer the latent variable or construct (Schumacker and Lomax, 2010).

Convergent validity

Convergent validity is concerned with measuring the degree of a positive relationship among scale items developed to measure the same concept/construct (Nachmias and Nachmias, 2007). In other words, convergent validity confirms that measures that should be theoretically related are in reality related.

Convergent validity can be assessed by confirmatory factor analysis (CFA) through three main criteria. First, factor loadings should be greater than 0.5 or higher and ideally 0.7 or higher; second, composite reliability should be above 0.7 and ideally 0.8 or higher. Third, average variance extracted (AVE) should to be above the cut-off- value of 0.5 or greater to suggest adequate convergent validity (Hair et al., 2006). Composite reliability is a measure of the overall reliability of a set of heterogeneous but similar indicators, while, individual variable reliability can be tested using Cronbach alpha , the composite reliability is concerned with testing the reliability of a construct/ latent variable. The average variance extracted reflects the overall amount of variance in the manifest variables accounted for by the latent construct (Hair et al., 2006).
Both the composite (construct) reliability and the average variance extracted have been calculated in this study by using the following two formulas (Hair et al., 2006)

$$\mathbf{CR} = \frac{\text{(Squared sum Factor loadings for construct items)}}{\text{(Squared sum Factor loadings for construct items)} + \text{(Sum of the estemation error variance for a construct)}}$$

$$\textbf{Average variance extracted (AVE)} = \frac{\text{Sum factor loadings for construct items}}{\text{Number of items per construct}}$$

Discriminant validity

Discriminant validity aims at demonstrating that a measure does not correlate with another measure from which no theoretical relationships are expected. In other words, measures that should not theoretically be related are in reality not related (Schumacker and Lomax, 2010). CFA provides two common ways of testing discriminant validity (Hair et al., 2006). First, the correlation between any two specific constructs can be fixed as equal to one; in essence it is the same as identifying that the items that structure two constructs might just as well make only one construct. If the fit of the two-construct model is considerably different from that of the one-construct model , then discriminant validity is supported (Byrne, 2010). Hair et al. (2006) confirmed that in practice this method does not offer strong evidence of discriminant validity, because strong correlations, sometimes as high as 0.9, can still create significant difference in fit between the two models. As a result a second more rigorous test was provided by Fonell and Larcker (1981), and Hair et al. (2006) by comparing the average variance-extracted (AVE) value for any two construct with the square of the correlation estimates between the same two constructs. The variance extracted estimates should be greater than the squared correlation estimates to have evidence of discriminant validity (see Section 4.4.2.2.2).

3.5.2.1.2.1 Assessing Common Method Variance (bias)

Common method variance (CMV) refers to the amount of spurious covariance shared among the research variables because of the common method employed in collecting data (Kline et al., 2000; Liang et al., 2007; Boyar et al., 2008). In other words, CMV creates false internal consistency, that is, an apparent correlation among variables produced by their common source (Chang et al., 2010)

In classic survey studies in which all the collected data are self-reported and have been collected through the same questionnaire from the same participants during the same period of time, common method variance may be a concern (Lindell and Whitney, 2001). CMV can cause a regular measurement error and further bias the estimates of the actual relationship among theoretical factors. The likely causes of spurious correlation between self-report measures are the consistency motif (tendency of respondents to attempt to keep consistency in their responses to similar questions), social desirability (tendency on the part of respondents to present themselves in a favourable way, regardless of their actual feelings about an area or topic), and behaviour due to knowledge deficiency (Podsakoff et al., 2003; Nandakumar et al., 2010).

Several approaches have been recommended to control or minimize CMV (see, for example, Podsakoff et al., 2003; Malhotra et al., 2006; Chang et al., 2010). These approaches can be categorized into two groups; ex-ante approaches fulfilled in the research design stage and ex-post statistical analyses employed after the research has been conducted. The ex-ante approaches include some precautionary procedures that can be employed in the research design stage to avoid any expected CMV (Podsakoff et al., 2003). For example, the dependent variables could be constructed using data from different sources than the independent variables. This procedure is clearly the best option as, by definition, spurious correlations due to CMV cannot arise (Chang et al., 2010). Furthermore, the ex-ante procedures include: ensure the anonymity and confidentiality are of the questionnaire (Podsakoff et al., 2003), and to collect the data from high ranking informants who are well informed and can ensure the accuracy and validity of the collected data (Sharma et al, 2009) .

Several ex-post statistical remedies have been discussed in the literature and tested in this study to detect and control any potential CMV, such as a post hoc Harman one-factor analysis where all the research items (dependent and independent) are allowed in EFA to be loaded into only one single factor, to test whether one single factor does emerge or whether one factor accounts for the majority of the covariance between the measures; if not, the claim is that CMV is not a general issue (Malhotra et al., 2006). However, Podsakoff et al. (2003) argue that Harman's test is insensitive and there is no clear guideline as to what should be the satisfactory percentage of explained variance of a single-factor model. Therefore, to support the results of the Harman one-factor analysis test, the researcher can use CFA to compare the model fit of two models, where the first model allows all the research items (independent and dependent) to measure on factor and the second model allows all the items (independent and dependent) to load on their theoretical constructs. If common method variance is largely responsible for the relationship among the variables, the first model should fit the data better than the second model (Podsakoff et al., 2003; and Chang et al., 2010) (see Section 4.4.2.3).

3.5.2.2 Structural Equation Modelling

Structural Equation Modelling (SEM) has grown to be one of the main techniques of data analysis that attract many scholars across different disciplines and progressively more in the social sciences (Chow and Chan, 2008; Oke et al., 2008; Totterdell et al., 2008; Čater and Čater, 2010). The term *structural equation modelling* suggests two main features of the procedure: (a) that the causal processes are characterized by a series of structural (i.e. regression) equations, and (b) that these structural relations can be modelled in a picture to enable a clearer conceptualization of the theory under stud (Tabachnic and Fidell, 2007). Structural equation modelling was employed in the current study not only because this data analysis technique can test the causal direct and indirect relationship between the research variables (Byrne, 2010), but also to test whether or not the structural model (paths of the causal structure) are equivalent (i.e., invariant) across two groups (Byrne, 2010) of hotels (above average financial performance and under average financial performance) to identify which quality management practices can generate a competitive advantage.

Additionally, SEM is a technique to analyse multiple and interrelated relationships among the constructs for model building (Hair et al., 2006; Tabachnic and Fidell, 2007; Chen and Quester, 2008; and Byrne, 2010). It is the only analysis that allows complete and simultaneous tests of all relationships for complex and multidimensional phenomenon (Tabachnic and Fidell, 2007:679). In other words, according to Muthen (2002:82) "structural equation modelling (SEM) took factor analysis one step further by relating the constructs to each other and the covariance in system of linear regressions thereby purging the structural regressions of biasing effects of measurement error". SEM allows dependent variables in one equation to become independent variable in another equation. In addition, SEM allows representing latent variable in the relationships between variable while taking into account the estimated measurement error related to the imperfect measurement of variable as well (Schumacker and Lomax, 2010).

SEM has unique characteristics that are not found in the other multivariate techniques. Table 3.5 shows the differences between SEM and other multivariate procedures.

Table 3-5: The Differences between SEM and other Multivariate Procedures

SEM methodology	**Other multivariate procedures**
It takes a confirmatory approach in analysing data	They take an exploratory approach to the data analysis
It provides explicit estimates of the error variance parameters	They are incapable of either assessing or correcting for measurement error (e.g. regression or the general linear model)
It uses both observed and unobserved (latent) variables in data analysis	They are based on observed measurements
It is easy and widely applied method that can investigate both of direct and indirect effects among constructs in one shot.	They cannot measure the indirect effect between model relationships

Source: Adopted from Byrne (2010:3-4)

3.5.2.2.1 Assumptions of SEM

There are many assumptions/issues that should be considered before testing a model with SEM (Byrne, 2010; Hair et al., 2006; Tabachnic and Fidell, 2007). Those issues, which are related to (a) sample size and missing data, (b) normality and outliers, (c) linearity, (d) multicollinearity and singularity, and (e) item per construct issues, are discussed below:

(a) Sample size and missing data

Nunnally (1967:355) suggested (without giving any supporting evidence) that in SEM estimation 'a good rule is to have at least ten times as many subjects as variables.' Hair et al. (2006) suggested a more rigorous rule of 15 respondents for each parameter estimated[7] in the model. Several authors such as Barclay et al. (1995), Chin (1998), Chin and Newsted (1999), Kahai and Cooper (2003), adopted Nunnally's (1978) rule of 10 variable, though none of these researchers refers to the original source.

Marsh and Bailey (1991) suggested that the ratio of indicators (*p*) to latent variables (*k*) rather than the rule of 10 as suggested by Nunnally (1978) , may be a significantly better basis to calculate sample size, based on an assumption made by Boomsma (1982) who concluded using a ratio r= p/k of indicators to latent variables. If r = 4 that would require at least 100 sample size for adequate analysis; and for r = 2 that would require at least 400 sample size. Marsh et al. (1988, 1996, 1998) ran 35,000 analyses on LISREL CFA analysis, yielding data that led to the conclusion that, if r = 3 it would require at least 200 sample size; r = 2 would require at least 400 sample size and r = 12 would require a sample size of at least 50.

Hair et al. (2006) suggested that further crucial considerations in determining the required sample size for SEM include the following; estimation technique, model

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[7] Parameter estimate: one parameter can be estimated for each unique variance and covariance between the observers measured items (Hair et al., 2006). It is calculated as p (p + 1) / 2 where p is the observed variables (Byrne, 2010).

complexity, amount of missing data, and amount of average error variance among the reflective indicators.

First, the most familiar SEM estimation technique is the maximum likelihood estimation (MLE), where the normality assumption is met (acceptable skeweness and kurtosis), and there is no missing data, a lot of outliers, and continuous variable data exist (Schumacker and Lomax, 2010). Additionally, it can give valid results with small sample size less than 50 (Tabachnick and Fidell, 2007; Byrne, 2010), but the recommended minimum sample size sample to guarantee stable MLE results is 100-150 and preferably 200 (Hair et al., 2006).

Second, more sample size is required if the model is complex or there is a higher level of missing data (Hair et al., 2006). Third, the average error variance of indicators (more recently researchers preferred the communality concept) was found to be a more relevant way to approach the issue of the sample size, based on an assumption that models containing multiple constructs with communalities less than 0.5 (standardized factor loading estimation less than 0.7) require larger sample size for model stability and convergence (Hair et al., 2006).

The current study sample size is 288 hotels and according to the previous discussion it can be considered as an adequate sample size for SEM test for the following reasons: the instrument contains seven constructs to measure quality management and competitive advantage with 24 indicators, therefore according to the rule of 10 suggested by Nunnally (1967) the current study sample size (288) exceeds the required sample size (240). Second, according to the ratio of indicators (p) to latent variables (k) suggested by Marsh and Bailey (1991), the current study ratio (r) is 3.42 (24/7) which means the current study sample size (288) is in the acceptable range. Third, the current study sample size (288) exceeds the preferred sample size of 200 suggested by Hair et al. (2006) to obtain stable MLE solutions. Fourth, as is illustrated later in Chapter Four, no multiple factor loading estimation was found to be less than 0.7 and communalities were not less than 0.5, which means that no larger sample size is required. Dealing with missing data has been previously discussed in EFA, Section 3.5.2.1.1.

(b) : Normality and outliers

Most of the SEM estimation techniques assume multivariate normality (Tabachnick and Fidell, 2007). To determine the extent and shape of normality, outliers and the skewness and kurtosis of the measured variables were examined in the same way as described in EFA, section 3.7.2.1.1.

(c): Linearity

SEM techniques test only linear relationships between variables. Linearity between latent variables is difficult to test (Tabachnick and Fidell, 2007). However, linear relationship between pairs of observed variables can be tested through inspection of scatterplots, as previously explained in EFA, section 3.7.2.1.1.

(d): Absence of Multicollinearity and Singularity

If variables are perfect linear combinations of one another (singularity) or are exceptionally highly correlated (multicollinearity), the required matrices cannot be inverted (Byrne, 2006). Generally, SEM programs give a warning messages if singularity exists in the covariance matrix (Tabachnick and Fidell, 2007).

(e): Items per construct

There is no agreement on the literature on how many indicators are required for each construct in the SEM test (Byrne, 2006). Some researchers prefer several indicators for each construct in an attempt to completely represent the construct and increase reliability, while others prefer using the smallest number of indicators to adequately represent a construct (Hair et al., 2006). More items per construct are not necessarily better as it requires larger sample size (Byrne, 2006; Tabachnick and Fidell, 2007) and may make it difficult to produce truly uni-dimensional constructs. In practice, CFA can be conducted with only one single variable representing some factors. However, good practice dictates at least three items per each factor , preferably four, to produce good results and to avoid any model identification problems (Hair et al., 2006). In the current study, quality management is supposed to be measured by six constructs; four of them were measured by three variables while two were measured by five variables, based on an extensive literature review, as previously illustrated (see operationalization of the study constructs section 3.1).

The use of SEM in the current study was reported through five stages: model specification, model identification, model estimation, model evaluation, and model modification.

3.5.2.2.2 Model Specification

Model specification entails "determining every relationship and parameter in the model that is of interest to the researcher" (Schumacker and Lomax, 2010:213). This has been done in the current study through an extensive review of the previous studies to develop the conceptual framework and hypotheses (see research framework and hypotheses section 2.3). If the conceptual model is misspecified, biased parameter estimates could arise; parameter estimates that are different from what they are in the actual population model, that is, specification error (Schumacker and Lomax, 2010). Once the conceptual model is correctly specified, the correspondence between the indicators and factors as well as the correlation between the factors can be done in SEM using AMOS software in two ways, first fixing one of the factor loadings to 1.00, second fixing the factor variance to 1.00 (Raykov and Marcoulides, 2006). AMOS software automatically fixes the first one of the factors loading estimation to 1.00 (Arbuckle, 2008).

Schumacker and Lomax, (2010) provided a set of recommendations for model specification. These recommendations and the way they were fulfilled in the current study are illustrated in Table 3.6.

3.5.2.2.3 Model identification

Once a model has been specified, the next stage is to identify whether the model is identified (Schumacker and Lomax, 2010). The identification issue relates to whether there is enough information (how many data points we have to work with) to identify a solution to a set of equations. Information is constituted by the sample covariance matrix, where one parameter can be estimated for each unique variance and covariance between the observers (p) measured items (Hair et al., 2006). It is calculated as p (p + 1) / 2 where p is the observed variables (Byrne, 2010). One degree of freedom (df) is then used / lost for each parameter estimated (Hair et al., 2006).

Table 3-6: Recommendations for Model Specification

Recommendation	How was it fulfilled?
Provide a purpose for the study, including why employing SEM rather than another statistical analysis approaches.	The study investigates the causal relationship between QM and CA and the reason for employing SEM were explained in section 3.7.2.2.
Describe the latent variables, and indicate how they are measured.	This was done in operationalization of the study constructs, section 3.1.
Provide a theoretical foundation for your measurement model(s) and structural model.	The current study based on a well know theory of the resource based view of competitive advantage in which QM can be considered a source that generates CA. This has been justified and supported by several empirical studies in sections 2.2. and 2.3.
Clearly state your hypotheses.	This was done in the research framework section 2.3.
Include a figure or diagram of your measurement and structural models. Including describing every parameter in the estimated models	The structural model was initially developed in the research framework section 2.3. then the structural model and the measurement model was pictured collectively and analysed in the research results in Chapter Four

Source: adopted form Schumacker and Lomax (2010: 238-239).

Structural models may be *underidentified*, *just-identified* or *overidentified*.

An underidentified model, also named unidentified, is one in which the number of parameters to be estimated is more than the number of variances and covariances of the observed variables (data points) (Raykov and Marcoulides, 2006). For example a measurement model with only a single construct measured by two items (variables) is an underidentified model, because there are two factor loadings and two error factors to be estimated (four parameters) and the variance covariance can be calculated by 2(2+1)/2 = 3. Therefore, the number of parameters to be estimated (four) is more than the number of variances and covariances of the observed variables (three) and there are negative degrees of freedom. As a result, the model contains insufficient information (from the input data) for the purpose of attaining a determinate solution of parameter estimation (Byrne, 2006).

A just-identified model “is one in which there is a one-to-one correspondence between the data and the structural parameters. That is to say, the number of data variances and covariances equals the number of parameters to be estimated" (Byrne, 2006:31). For example, a measurement model with only a single construct measured by three items(variables) is a justidentified model, because there are three factor loadings and three error factors to be estimated(six parameters) and the variance covariance can be calculated by 3(3+1)/2 = 6. Therefore the number of parameters to be estimated (six) is equal to the variances and covariances (six). Consequently, a just- identified model should have a perfect fit (Hair et al., 2006). However, a just-identified model is not scientifically attractive because it has no degrees of freedom and for that reason can never be rejected (Byrne, 2006; and Raykov and Marcoulides, 2006).

An overidentified model is one in which the number of estimated parameters is not exceeding the number of variances and covariances of the observed variables (data points) (Byrne, 2006). For example, the current study CFA model consists of 50 parameters to be estimated (22 factor loadings and 22 error variances and 6 factor covariances) while, the number of variances and covariances of the observed variables (data points) can be calculated as 22(22+1)/2=253 and this give 203 degrees of freedom (253-50) .This situation results in positive degrees of freedom that allow for rejection of the model. The aim in SEM, then, is to specify a model such that it meets the criterion of overidentification (Arbuckle, 2008; and Byrne, 2010).

Schumacker and Lomax, (2010) provided a set of recommendations for model identification. These recommendations and the way they were fulfilled in the current study are illustrated in Table 3.7.

Table 3-7: Recommendations for Model Identification

Recommendation	How was fulfilled
Specify the number of distinct values in the sample matrix	Was done for each model according to the equation of p (p + 1) / 2 where p is the observed variables.
Specify the number of free parameters to be estimated	Was done for each model as described in the research result Chapter four to identify how many factor loading, error variance and factor covariance exist in each model.
Specify if the model is *underidentified, just-identified* or *overidentified*	Was done in each model by subtracting the number of parameter estimates form the number of distinct values.
Resolve any non-positive definite error message resulting.	No error messages were found except one value as illustrated in section 3.7.2.6.1. (Issues in identification and problem in estimations).

Source: adopted form Schumacker and Lomax (2010:240)

3.5.2.2.4 Model estimation

Several factors can effect parameter estimation in structural equation modelling, such as missing data, outliers, multicollinearity, nonnormality of data distributions. These greatly affect the estimation process and often result in error messages relating to Heywood cases (variables with negative variance) (Schumacker and Lomax, 2010)

The data for the current study models was entered in AMOS v17 by using the maximum likelihood (ML) estimation technique and AMOS Graphic was used to draw the measurement and structural paths collectively. The maximum likelihood estimation technique was chosen because the multivariate normality assumption (acceptable skewness and kurtosis) is met, and there were no missing data, no outliers, and continuous variable data (Schumacker and Lomax, 2010). Skewness and kurtosis values (in SEM output) equal to or greater than 7 indicate early departure from normality (in the current study no value was greater than 7) . Additionally, the decision concerning the missing data was to delete it (less than 5 percent) and the decision to keep the small number of outlier has been justified (as discussed in Chapter Four). Finally, the independent and dependent variables are continuous variable data, and therefore the maximum likelihood estimation technique is appropriate for model estimation.

Schumacker and Lomax (2010) provided a set of recommendations for model estimation. These recommendations and the way they were fulfilled are illustrated in Table 3.8.

Table 3-8: Recommendations for model estimation

Recommendation	How was it fulfilled?
Did you edit data carefully to meet all assumptions?	All the required assumptions to run SEM were met and discussed in section 3.7.2.2.
What estimation technique is appropriate for your study?	Maximum likelihood (ML) estimation technique was employed and justification was discussed above.
Did you encounter Heywood cases (negative variance), multicollinearity, or a non-positive definite matrix?	One negative variance was found as illustrated in section, 3.7.2.6.1(Issues in identification and problem in estimations)
Which SEM program and version did you use?	AMOS v17

Source: adopted form Schumacker and Lomax (2010:241)

3.5.2.2.4.1 Issues in identification and problems in estimations

Once the measurement model is specified, identified and estimated, the next step is to revisit the issue of identification and any potential remedies (Hair et al., 2006). If the model meets the criterion of over-identification, no further action is required at that stage and no remedies are needed. All the tested models in the current study met the criterion of identification and no further action was required.

Another problem that may be encountered in SEM includes the estimation of parameters that are logically impossible, such as a negative error variance (also named Heywood case) (Hair et al., 2006). Negative error variance is logically impossible as it implies a less than zero percent error in an item and more than 100 percent of the variance is explained. Additionally, illogical standardized parameter estimations that exceed |1.0| are theoretically impossible and probably indicate a problem in the data (Byrne, 2010). No negative error variance was found in the current study models, except one parameter was found to have a negative error variance, the reason for this error is justified in section 4.2.3.1.

3.5.2.2.5 Model evaluation

Once the model parameter estimates are acquired, the nest step is to determine how well the data fit the model; in other words, to what extent is the theoretical model supported by the observed sample data? (Schumacker and Lomax, 2010). There are two aspects in model evaluation, first, an evaluation of the measurement model and second, evaluation of the structural model. The measurement model specifies relations between the observed variables and latent variable (Hair et al., 2006). Evaluating the measurement model entailed the use of CFA to test the factor loadings of each observed variable on the latent variable. This permitted the assessment of the constructs in terms of uni-dimensionality, convergent validity, and discriminant validity (Byrne, 2010). In this context, the measurement model was explained previously in CFA section 3.7.2.1.2, while the evaluation of the structural model is discussed below:

3.5.2.2.5.1 Evaluation of the structural model

Evaluation of the model fit is the most essential event in SEM testing (Hair et al., 2006). There are two ways to think about the model fit. The first is to examine the adequacy (fit) of each individual parameters of the model, while the second is concerned with examining the goodness-of-fit (GOF) of the entire model (Schumacker and Lomax, 2010; Byrne 2010). The discussion of examining the fit of each parameter is discussed below, while the criteria to evaluate the entire model fit are discussed later in this section.

First, test the adequacy of each parameter estimate

Schumacker and Lomax (2010) identified three key features of the adequacy of each parameter. One feature is whether a free parameter is significantly different from zero (Byrne, 2010). Once parameter estimates are attained, standard errors for each estimate are also obtained. A ratio of the estimated parameter to the standard error estimated can be calculated as a critical value (C.R.), which is assumed normally distributed; that is the critical ratio (C.R.) can be calculated through dividing parameter estimate by its standard error (Byrne, 2010; Schumacker and Lomax, 2010). As such, it functions as a z-statistic in testing that the estimate is statistically different from zero. Based on a probability level of .05, the test statistic must exceeds the value of ± 1.96 before the null hypothesis (that the estimate equals 0.0, in other words, no relationship exists) can be rejected (Byrne, 2010). The parameter estimate, standard error, and critical value are automatically provided in the AMOS output for a model. A second feature is whether the sign (positive/negative) and the direction of the estimate are consistent with what is anticipated from the theoretical model (Schumacker and Lomax, 2010). A third feature is that parameter estimates should be logical, that is, they should be within an anticipated range of values (e.g. no negative values obtained and correlations should not exceed the value of 1.00) (Byrne, 2010). Thus, all free parameters should be in the expected positive/negative direction, be statistically different from zero, and make practical sense (Schumacker and Lomax, 2010).

The AMOS program provides also squared multiple correlations (R^2) for each single observed variable separately. These values shows how well each single observed variable serves as measure of the latent variables and range from 0 to 1 (Byrne, 2010). Squared multiple correlations are also specified for each endogenous variable separately. These values also range from 0 to 1 and serve as an indication of the strength of the structural relationships (Schumacker and Lomax, 2010).

<u>Second, test the model as a whole</u>

The goodness-of-fit for the entire model (GOF) describes how well the hypothesized model reproduces the covariance matrix between the indictors' items. In other words, the model is first specified (based on a theory) and then the sample data is utilized to test the model to determine the goodness-of-fit between the hypothesized model and the sample data (Byrne, 2006) .

The model fit compares the theory to reality as characterized by the sample data. In other words the estimated covariance matrix ($\sum k$) is mathematically compared to the actual observed covariance matrix (S) to supply an estimate of model fit, where the closer the values of these two matrices are to each other, the better the model fit (Hair et al., 2006).

GOF measures for the whole model can be classified into three groups: absolute measures, incremental measures and parsimony measures (Arbuckle, 2008). In the following section, some basic elements in calculating GOF are reviewed, followed by an explanation of each category of GOF.

The basics of goodness- of -fit

Chi-square (χ2) GOF

Chi – square is the fundamental measure of fit and it provides a mathematical result of the difference between the estimated covariance matrix (∑k) and the actual observed covariance matrix (S) by the following equation $\chi2$ = (N-1) (S - (∑k), where N is the overall sample size (Hair et al., 2006). The χ2 value increases if the sample size increases. Likewise, the SEM estimated covariance matrix (∑k) is influenced by how many parameters are free to be estimated, so the model degree of freedom *df* (calculated by subtracting the number of estimated parameters from the number of data points i.e., variances and covariances of the observed variables) also influences the χ2 value (Byrne, 2006). In contrast with the other statistical methods which aim to obtain smaller probability values (i.e. P- values-< 0.5) to indicate that a relationship is exist, with χ2 GOF test in SEM, the smaller the *p*- values the greater the possibility that the estimated covariance matrix (∑k) and the actual observed covariance matrix (S) are not equal. Therefore smaller χ2 values (and consequently larger P- values) should show no statistically significant difference between the two matrices (S) and (∑k) (Hair et al., 2006; Tabachnick and Fidell, 2007). Hence, the researcher hopes to have an insignificant chi-square value (fail to reject the null hypothesis) in the model as evidence that the model fits the data well.

The Chi – square test is the fundamental measure in SEM, but there are several limitations to the chi-square as it depends on sample size and will almost always be significant with large samples (Harrington, 2009); hence, its value cannot be used alone.

Therefore three alternative goodness of fit measures (absolute measures, incremental measures and parsimony measures) were developed to assess the GOF of a specific model (Raykov and Marcoulides, 2006).

First, Absolute fit measures

An absolute fit measure is a measure of overall model goodness-of-fit. “This type of measure does not make any comparison to a specific null model (incremental fit measure) or adjust for the number of parameters in the estimated model (parsimonious fit measure)" (Hair et al., 2006:706). The most fundamental fit index is the $\chi2$ but because $\chi2$ GOF cannot be used alone, several alternative fit indexes such as RMR, SRMR, RMSEA and normed $\chi2$ were developed to correct the bias, caused if using $\chi2$ alone, against larger samples and increased model complexity (Hair et al., 2006). These GOF measures are presented next.

Root Mean square Residual (RMR) and Standardized Root mean square Residual (SRMR)

The **RMR** is the square root of the average squared amount by which the sample variances and covariances (S) differ from the estimated obtained variances and covariances ($\sum$) under the assumption that the model is correct (Arbuckle, 2008).

Good-fitting models have small RMR. However, sometimes it is difficult to interpret an unstandardized residual because the scale of the variables affects the size of the residual (Tabachnick and Fidell, 2007; Harrington, 2009). Therefore, a standardized root mean square residual (SRMR) was developed, where small values indicate good-fitting models and the lower the better, while the higher the worst and this puts both values (RMR,SRMR) into a category of indices sometimes named as badness-of-fit measures (Hair et al., 2006). Generally speaking SRMR has a range of values between 0 and 1, where values of 0.08 or less are accepted (Byrne, 2006, Hair et al., 2006), and values of 0.05 or less are preferred (Schumacker and Lomax, 2010).

Root Mean Square Error of Approximation (RMSEA)

RMSEA value differs from RMR in that it has a well-known distribution; therefore, it can better characterize how well the model fits a population, not just an estimation sample. Moreover, it attempts to correct for both model complexity and sample size by containing both in each calculation (Byrne, 2006). Lower RMSEA value indicates better fit while higher value indicates a worse fit, so just like the RMR and SRMR, it can be categorized as a badness-of - fit index (Hair et al., 2006).

Normed $\chi 2$

The Normed $\chi 2$ GOF is a ratio of chi square $\boldsymbol{\chi 2}$ to the degree of freedom (*df*) for the model. Basically, $\chi 2 : df$ on the order of 3:1 or less are associated with better fitting (Hair et al., 2006).

Second, Incremental measures

Incremental measures differ from the absolute fit indices in that they asses how well a particular model fits relative to alternative baselines (null/ independence) model (Hair et al., 2006). The most widely applied incremental measures are the Normed Fit Index (NFI), Comparative Fit Index (CFI), and Tucker Lewis Index (TLI).

The Normed Fit Index (NFI) evaluates the estimated model by comparing the chi square $\chi 2$ value of the model to the $\chi 2$ value of the independence/ null model. Its value ranges between 0 and 1.00, where high values of NFI (greater than 0.9 and ideally 0.95) are indicative of a good-fitting model (Tabachnick and Fidell, 2007). The Comparative Fit Index (CFI) is one of the most widely employed indices as it is considered as an enhanced version of the Normed Fit Index (NFI), which is insensitive to model complexity (Hair et al., 2006). The value of the CFI is normed so it ranges between 0 and 1.00 where, the larger the CFI the better the fit and CFI values greater than 0.9 and ideally greater than 0.95 are often indicative of good-fitting models (Tabachnick and Fidell, 2007).

The Tucker Lewis Index (TLI) provides very similar values to CFI by comparing a specified theoretical measurement model with the baseline null model, but it is not normed, so its value can be below 0 or above 1.00, where a higher value of TLI suggests a better fit than a model with lower value (Hair et al., 2006).

Parsimony Fit Indices

These groups of measures were developed to provide information about which model among a set of competing models is the best, considering its fit relative to its complexity. The parsimony ratio (PR) of any model forms the source for these measures and can be calculated

$$PR = \frac{d}{di}$$

as the ratio of degree of freedom (*df*) utilized by a model to total degree of freedom available (Hair et al., 2006).

Where *d* is the degrees of freedom of the hypothesized model and *di* is the degree of freedom of the independence/null model (Arbuckle, 2008).

Parsimony comparative Fit Index (PCFI) and Parsimony Normed Fit Index (PNFI) are measures that can be considered as Parsimony Fit Indices (Byrne, 2006).

The PCFI adjusts the CFI using PR. Its value ranges between 0 and 1.00; therefore two models are compared and the one with the higher value of PCFI is preferred based on the combination of fit and parsimony characterized by the index (Hair et al., 2006). However PCFI values greater than 0.5 can be considered as acceptable (Tabachnick and Fidell, 2007). Parsimony Normed Fit Index (PNFI) adjusts the normed fit index (NFI) by multiplying it by the parsimony ratio (PR). Similar to PGFI value, the PNFI value ranges between 0 and 1.00 ; therefore two models are compared where the one with the higher value of PNFI will be preferred (Hair et al., 2006). However, PNFI values greater than 0.5 can be considered as acceptable (Tabachnick and Fidell, 2007).

It is worth noting that no single value can be employed to differentiate a good model from a bad model; at least one incremental index and one absolute index should be reported, in addition to the chi square $\chi 2$ value and the associated degree of freedom (*df*), and at least one of the indices should be a badness-of-fir index (Hair et al., 2006). Additionally the previous cut-off values should be related to several model characteristics such as sample size, model complexity, and degree of error in model specification. Table 3.9 provides the recommended cut -off values for SEM fit indices.

Table 3-9: The recommended cut -off values for SEM fit indices

Fit index	cut-off values from literature	References
Absolute fit measures: Chi-square/df SRMR RMSEA **Incremental fit measures:** NFI CFI **Parsimonious fit measures:** PCFI PNF	 ≤ 5.0 ≤ 0.08; ≤.05 ≤0.05 ≥ .90 ≥ .90 >0.5 >0.5	Byrne, (2006,2010), Hair et al. (2006), Raykov and Marcoulides,(2006); Tabachnic and Fidell (2007); Arbuckle,(2008); Chow and Chan (2008); Hooper et al. (2008); Totterdell et al. (2008); Harrington (2009); Schumacker and Lomax (2010).

Source: Adapted from literature

Schumacker and Lomax, (2010) provided a set of recommendations for model evaluation. These recommendations and the way they were fulfilled in the current study are illustrated in Table 3.10.

Table 3-10: Recommendations for model evaluation

Recommendation	How was it fulfilled?
Specify separate measurement models and structural models	was done by first conducting CFA separately then the structural models were test using SEM
Report the correct model fit indices, whether for the whole model or the individual parameters	was done as explained above
Report the composite reliability of factors	was done in CFA section 3.7.2.1.2
Report construct validity of factors	was done in CFA section 3.7.2.1.2
Present the statistical significance of parameter estimates with effect sizes	was done in each model as explained above.

Source: adopted form Schumacker and Lomax (2010:245)

3.5.2.2.6 Model modification and validation

The final step in SEM is to test model modification in order to obtain a better data-to-model fit. If the model fit indices in the hypothesized structural model are less than satisfactory, a researcher usually performs a *specification search* to obtain a better fitting of the hypothesized model to the observed sample variance-covariance matrix (Kline, 2011). One may remove parameters that are insignificantly different from zero and/or add extra parameters to attain at a modified mode (Tabachnic and Fidell, 2007). For removing parameters, the most generally employed techniques are to (a) compare the *t* statistic for each single parameter to the tabulated *t* value (i.e. $t > 1.96$) of statistical significance and (b) utilise the Wald (W) statistic (same interpretation as the *t* statistic) (Schumacker and Lomax, 2010). To add additional parameters, the most regularly used procedures are (a) choose the highest value of modification index (MI) (the likely value that $\chi 2$ would decrease by if a specific parameter was to be added), (b) choose the highest value of the expected parameter change statistic (EPC) (the new parameter approximate value), and (c) use the Lagrange multiplier (LM) statistic (same interpretation as the modification index) (Tabachnic and Fidell, 2007).

A researcher could also study the residual matrix (or the standardized residual matrix is more useful) to obtain clues as to which observed variances and covariances are not well accounted for by the hypothesized model. Large values of the standardized residuals (greater than 1.96 or 2.58) indicate that a specific variable relationship is not well accounted for in the hypothesized model (Schumacker and Lomax, 2010).
For the current study, the researcher followed the previously described procedures to deal with parameters that were insignificantly different from zero in order to achieve a satisfactory model fit.

After obtaining a satisfactory model fit, the researcher tests the research hypotheses (which should be previously justified, see Section 2.3 research framework and hypotheses). Each path in the structural model between the latent variables represents a specific hypothesis. In this regard it is worth noting that normally we test the null hypothesis (no relationship exist) and if the P value is less than the significance level (i.e. t > 1.96) we reject the null hypothesis, and if the P value is greater than the significance level (i.e. t < 1.96), we fail to reject the null hypothesis (Pallant, 2007). The main determinant for accepting or rejecting hypothesis is the significance of standardised coefficient of research parameters. The levels of significance that were employed in the current study were less than 0.05, 0.01 and 0.001; the lower the significance level, the more the data must deviate from the null hypothesis (no relationship exists) to be significant. Therefore, the 0.001 level is more conservative than the 0.01 level. Therefore, the significance level less than 0.05 can be considered as an acceptable significance, while less than 0.01 can be considered strong significance, and less than 0.001 can be considered a high significance level in the current study. It is worth noting here that some authors considered a probability level less than 0.1 ($P \leq 0.1$) as an acceptable probability value such as those studies by Samson and Terziovski (1999); Ahire and Dreyfus (2000); Kaynak (2003); Zu et al. (2008). This probability value ($p \leq 0.1$) is considered a weak significance level in the current study.

The final step in SEM is to validate the model by repeating the study (using a different sample), cross-validation (randomly splitting the original sample and performing the analysis on both data sets), or bootstrapping the parameter estimates to identify the amount of bias (Schumacker and Lomax, 2010). The replication of the current study with a different data is prohibitive given the time, money, or the available resources (Schumacker and Lomax, 2010). Additionally, the current study data was already split into two groups to identify which group (hotels) has a competitive advantage over the other; therefore each group of data could not be split again into two groups which would give a small data size for cross validation, given the assumption that cross validation needs a large sample of data that can be split randomly into two subsamples of equivalent and sufficient size (Schumacker and Lomax, 2010). However, Browne and Cudeck (1989,1993) developed an index called a single-sample expected cross-validation index (ECVI) to compare alternative models using only one single sample of data, where the alternative model that results in the *smallest* value of ECVI should be the most stable in the population. The akaike information criterion (AIC) developed by Akaike (1987) can also be employed as a criterion for model comparison. The AIC is a distinct type of fit index that considers not only the measure of fit but also the model complexity (Akaike, 1987), and it is similar to the so-called Bayesian information criterion (BIC) (Byrne, 2010). The two indices, AIC and BIC, are extensively used in applied statistics for model comparison. Commonly, models that have lower values of ECVI, BIC, and AIC are considered to have better means of data description than those models with higher such indexes (Byrne, 2010).

Moreover, the bootstrap technique was also employed in the current study to validate the hypothesized model. The bootstrap technique considers the original random data sample to represent the whole population (pseudo population) and resamples from it (the original data) a specified number of times to produce sample bootstrap estimates and standard errors (Byrne, 2010). The bootstrap estimates and standard errors of these samples are averaged and utilized to attain a confidence interval around the bootstrap estimates average; this average is named a bootstrap estimator (Schumacker and Lomax, 2010). The bootstrap estimator along with the associated confidence interval is examined to determine how good or stable the sample statistic is as an estimate of the whole population parameter (Byrne, 2010). The main advantage of bootstrapping is that it allows the researcher to examine the parameter estimates stability and consequently report their values with a high degree of accuracy (Kline, 2011)

3.5.2.2.7 Multi-group analysis

The aim of the current study is to identify which quality management practices give the hotel a competitive advantage (measured as above average financial performance) over its rivals.

Because financial performance as a latent construct (measured by two indicators) cannot be split to identify above average financial performance (competitive advantage) and under average financial performance, two models were proposed**. The first model** tests the relationship between QM and employee productivity (as an indicator of financial performance) and the **second model** tests the relationship between QM and revenue per room (as an indicator of financial performance).

Each model has been tested in SEM by using multi-group analysis procedure in which the data is split into two groups for those hotels that have above average employee productivity / revenue per room (competitive advantage) and those hotels that have under average employee productivity / revenue per room. The two groups models (above and under average performance) are compared to each other to find out the differences in the causal structure, i.e. paths from QMPs to the financial performance indicators (employee productivity / revenue per room), and therefore identify which QMPs give the hotel a competitive advantage over its rivals.

To find out whether or not the structural model (paths of the causal structure) is equivalent (i.e. invariant) across the previously mentioned two groups of interest, the automated multi-group approach was tested in SEM. The first step in testing for invariance across the two groups of interest requires the same number of factors and the factor-loading pattern to be the same across groups; as such, no equality constraints are forced on any of the parameters (Byrne, 2010). Thus, the same parameters that were estimated in the baseline model for each group separately are once more estimated in this multi-group model. In essence, then, the model can be considered as being tested here as a multi-group representation of the baseline models (No constraints /parameters are freely estimated). Accordingly, it incorporates the baseline models for above and under average employee productivity within the same file. This model is commonly termed as the *configural model* (Byrne 2010, and Hair et al., 2006).

This multi-group model serves two important purposes. *First*, it allows for invariance tests to be performed across the two groups *simultaneously*. In other words, parameters are estimated for both groups at the same time. *Second*, in testing for invariance, the goodness of model fit values of this configural model provides the baseline value which is compared against four constrained models (Byrne, 2010). In the first constrained model (i.e. measurement weights) the factor loadings are constrained equal across groups. In the second constrained model (i.e. structural weights) all estimated factor loadings, as well as structural paths coefficients, are constrained equal across groups, while in the third (i.e. measurement residuals) constrained model all estimated factor loadings, structural paths coefficients, and error variances are constrained equal across groups, and finally in the fourth constrained model (i.e. structural residuals) all estimated factor loadings, structural paths coefficients, error variances , and factor variance are constrained equal across groups (see Table 3.11).

Table 3-11: Multiple Group dialog box showing the configural model and specification of equality constraints on all factor loadings, factor paths coefficient, error variances, and factor variance.

Baseline/Configural model	No constrain (parameters are freely estimated)			
Parameters subset	Model			
	1	2	3	4
Measurement weights	✔	✔	✔	✔
Structural weights		✔	✔	✔
Structural residuals			✔	✔
Measurement residuals				✔

Adopted from (Byrne, 2010:220)

Of major interest in testing for multi-group invariance is the goodness of-fit statistics but, most crucially, the $\chi 2$ and CFI values which enable determination of the extent to which the parameters tested function equivalently across the groups (Byrne, 2010). Evidence of invariance can be based on CFI difference (ΔCFI) values versus the more traditional $\chi 2$ difference ($\Delta\ \chi 2$) values (Byrne, 2010).

CFI and $\chi 2$values of the unconstrained/baseline model are compared to the same values in the constrained model shown in Table 3.11, If the $\chi 2$ difference value (i.e. between the baseline model and the structural weights constrained model) is statistically significant at a probability of less than 0.001, it can be concluded that one or more of the structural paths coefficients is not operating equivalently across the two groups (Byrne, 2010). Additionally**,** Cheung and Rensvold (2002) confirmed that CFI difference (ΔCFI) value should exceed the value of -0.01 to have evidence that the hypothesis of invariance across the group of interest be rejected.

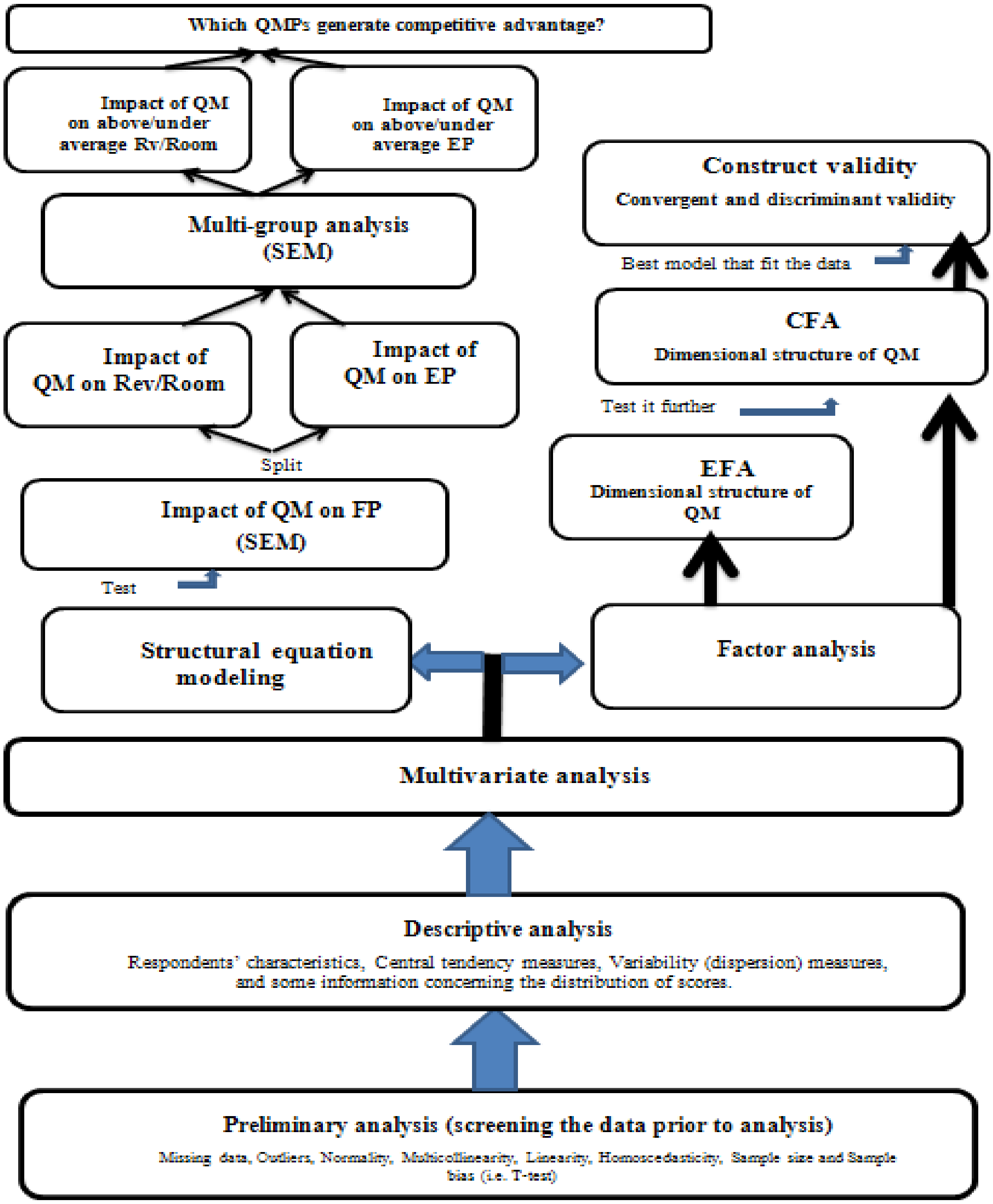
3.6 Summary

This Chapter started with developing operational definitions for the current study constructs (quality management and competitive advantage.

Additionally, a summary of the methods that were employed to achieve the current study objective was provided. This was followed by in –depth discussion of the research design (adopted research philosophy, research approach, research strategy, time horizon, and data collection methods). Perspectives of research design were explained to clarify the assumptions that underlie the methodology. The choice of methodology was justified and following procedures were highlighted to introduce an integrated discussion and conclusive statements, which will guide the next phase of the research process. The positivistic philosophy was the appropriate paradigm to explore the causal relationship between quality management and competitive advantage. Thus, a quantitative approach was adopted to collect and analyse data.

This chapter also examined the study instruments used in this research. A survey questionnaire was the main method used. This chapter has defined the questionnaire, justified its use as the main source of data collection and explained the process of its construction. The content validity of the questionnaire was considered through the interviews with a group of research targets. Limitations of using the questionnaire as a data collection method were also discussed. This chapter explained the measurement of the research variables. After explaining the structure and administration of the questionnaire, the chapter considered the validity and reliability of research variables. The structure and the distribution of questionnaires were also discussed in this chapter. This study adopts the census method was used to collect survey data because of the small population size. This chapter also discussed AMOSv17, which was used in the computation of the data. The statistical analysis techniques that are employed in the current study (including preliminary analysis, descriptive analysis, EFA, CFA, and SEM) are summarized in Figure 3.6 which illustrates the current study data analysis process.

Figure 3-6 : Summary of data analysis process.



Chapter 4: Research Results

4.1 Introduction

This chapter sets out the findings by presenting the quantitative analysis of the data obtained from the questionnaire survey in order to test the dimensional structure of the quality management construct, identify which quality management practices generate a competitive advantage, and test whether the relationship between quality management and competitive advantage is direct or indirect. This analysis was carried out through successive phases (as discussed in Section 3.5). Firstly, preliminary analysis (screening the data prior to analysis) is carried out to some issues such as missing data, outliers, normality, multicollinearity, linearity, and homoscedasticity. Preliminary analysis also included sample size and sample bias to measure the differences between groups or variables (e.g. T-test). The next phase is concerned with some descriptive analysis which included the respondents' characteristics and some central tendency measures; variability (dispersion) measures; and some information concerning the distribution of scores. Finally, multivariate analysis, such as factor analysis (EFA and CFA) is employed to test the dimensionality of the QM construct, and structural equation modelling was used to investigate the direct and indirect effects between the variables of the research framework.

4.2 Preliminary Analysis (screening data prior to analysis)

Some issues that affect the quality of multivariate tests are discussed in this section, such as dealing with missing values and outliers, linearity, multicollinearity, and homoscedasticity, normality, adequate sample size and conducting the sample bias test.

4.2.1 Missing Data and Outliers

To check the current study for missing data, the SPSS package is used to identify the minimum and the maximum values. A lot of missing values are found in 12 out of 300 questionnaires, occurring in a random pattern and the decision is to exclude these questionnaires as they can cause dramatic effects on the research results (Hair et al., 2006). These 12 questionnaires are less than 5 percentage; therefore, the problems of missing data are less serious and almost any procedure for handling it yields similar results (Tabachnick and Fidell, 2007). As a result, a total of 288 valid questionnaires are used in the current study to analyse the data.

The boxplot in the SPSS package is used to detect outliers -cases that are extremely high or low- (Tabachnick and Fidell, 2007). Two types of outliers are found in the current study: the first one is in the boxplot related to variable number 14 (see Appendix 9). This outlier value falls within the ordinary range of values and is not particularly high or low but unique in the combination of values across the variables; as a result it was retained as per Hair et al.'s (2006) recommendation. The second type of outliers is in the boxplots related to the financial performance variables. These outliers are expected because normally some hotels might have higher financial performance than others. The decision is also to retain these values as they explain the uniqueness of the observation (Pallant, 2007).

4.2.2 Linearity , Multicollinearity , and Homoscedasticity

Linearity is checked using scatterplot and results are satisfactory and the all variables relationships are positive (an upward line can be drawn through the points). Because it is difficult to assess each pairs by scatterplots when numerous variables exist, some variables are randomly and checked through scatterplots as shown in Figure 4.1.

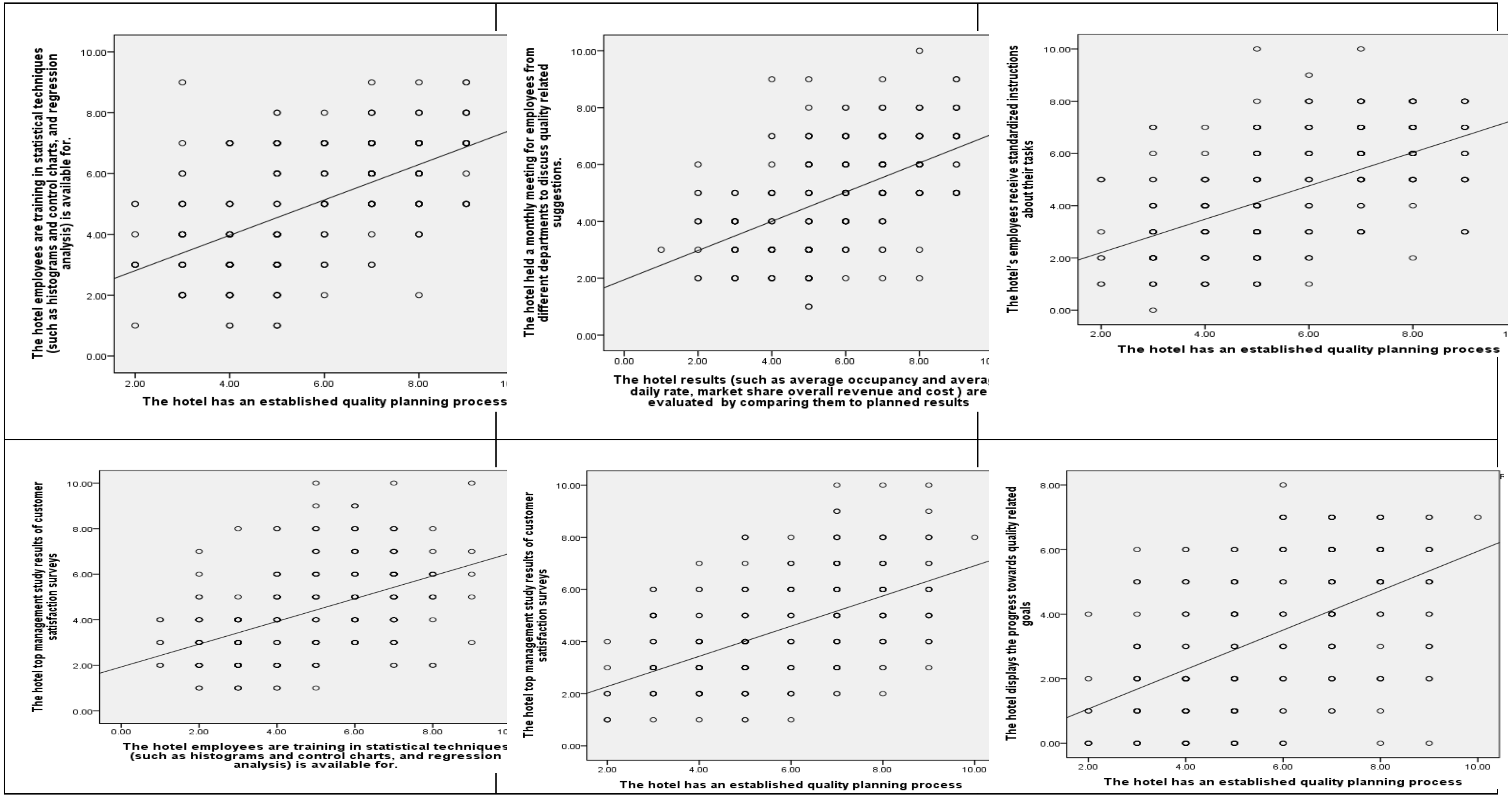
The positive relationships between variables are confirmed by checking the correlation coefficient (i.e. Pearson r), the values of correlation between variables range from 0.35 to and 0.86. No correlation is more than .9 (See Table 4.1) which indicates that there is no multicollinearity between the variables (Tabachnick and Fidell, 2007). Additionally, none of the individual relationships between the independent/dependent variable indicate a violation of homoscedasticity (cone or diamond shapes) and all relationships showed a roughly cigar shape, as shown in Figure 4.1.

Table 4-1: Pearson's r correlation coefficients

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	1																							
2	.828	1																						
3	.812	.852	1																					
4	.537	.542	.548	1																				
5	.551	.573	.541	.795	1																			
6	.562	.569	.549	.800	.785	1																		
7	.554	.564	.547	.759	.809	.771	1																	
8	.560	.561	.538	.783	.817	.800	.785	1																
9	.573	.559	.570	.432	.453	.469	.472	.463	1															
10	.551	.574	.561	.507	.522	.532	.535	.535	.812	1														
11	.596	.592	.601	.469	.502	.500	.519	.519	.821	.810	1													
12	.550	.555	.576	.429	.487	.504	.501	.504	.792	.827	.832	1												
13	.537	.543	.564	.488	.499	.534	.525	.564	.799	.818	.827	.794	1											
14	.429	.408	.406	.364	.354	.407	.388	.389	.396	.410	.449	.417	.394	1										
15	.452	.429	.415	.368	.381	.426	.403	.414	.378	.400	.438	.444	.372	.716	1									
16	.502	.482	.479	.427	.448	.477	.437	.467	.409	.418	.444	.462	.386	.763	.864	1								
17	.527	.487	.486	.470	.495	.492	.452	.480	.479	.501	.501	.521	.506	.476	.576	.586	1							
18	.577	.543	.544	.527	.544	.559	.518	.512	.492	.531	.530	.534	.498	.507	.567	.596	.837	1						
19	.563	.537	.514	.491	.510	.538	.489	.490	.493	.535	.542	.544	.520	.480	.553	.580	.868	.895	1					
20	.537	.566	.557	.469	.532	.527	.507	.476	.478	.505	.522	.478	.485	.532	.665	.656	.559	.585	.597	1				
21	.580	.597	.597	.493	.559	.533	.522	.504	.502	.540	.552	.514	.501	.536	.637	.654	.600	.580	.621	.861	1			
22	.585	.618	.598	.542	.569	.553	.533	.541	.500	.551	.541	.508	.519	.520	.625	.655	.593	.603	.632	.855	.867	1		
23	.609	.618	.595	.529	.575	.603	.553	.574	.531	.553	.551	.592	.532	.388	.414	.471	.462	.492	.514	.459	.476	.487	1	
24	.566	.574	.553	.473	.523	.534	.501	.502	.533	.525	.521	.557	.493	.380	.380	.438	.385	.413	.431	.420	.445	.451	.852	1

All Correlations are significant at the 0.001 level
1-22: variables that were employed to measure quality management
23-24: variables that were employed to measure financial performance

Figure 4-1: Scatterplots for some variables.



4.2.3 Normality

The frequency histogram shape of each variable distribution is examined; most of the shapes did not depart from the normality assumption, as shown in section 4.2.

4.2.4 Sample Size

Different guidelines are given concerning the adequate sample size depending on the employed data analysis techniques. The adequacy of the sample size is explained in depth when discussing the necessary conditions for factor analysis and structural equation modelling in section 4.4.1.

4.2.5 Sample Bias Test

Independent samples t-tests, are conducted to examine the non-response bias. The results of the above tests find no significant difference at 95% confidence between early and late respondents, as indicated in Table 4.2.

In the first section of the independent samples test shown in Table 4.2, the significance level for Levene's test is more than 0.05 for all the variables. This is more than the cut-off point of 0.05. This means that the t-value in the first line (Equal variances assumed) is to be used (Pallant, 2007).

All the values under the column labelled Sig. (2-tailed), which appears under the section named t-test for Equality of Means, are greater than 0.05, which means that there is no significant difference between early and late respondents to the questionnaires.

Table 4-2: Independent Sample T-Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
The hotel management provides the necessary financial resources to implement the QM practices	Equal variances assumed	1.735	.189	-.748	286	.455	-.16578	.22162	-.60199	.27042
	Equal variances not assumed			-.756	277.67	.451	-.16578	.21942	-.59772	.26615
The hotel has an established quality planning process	Equal variances assumed	.481	.488	.109	286	.913	.02469	.22577	-.41969	.46908
	Equal variances not assumed			.109	264.02	.913	.02469	.22680	-.42187	.47125
The hotel results are evaluated by comparing them to planned results	Equal variances assumed	.453	.502	.180	286	.857	.04145	.23057	-.41238	.49527
	Equal variances not assumed			.181	275.58	.856	.04145	.22888	-.40913	.49202
All hotel departments are involved in quality management related activities	Equal variances assumed	.632	.427	-1.118	286	.264	-.24250	.21684	-.66930	.18430
	Equal variances not assumed			-1.114	264.55	.266	-.24250	.21772	-.67118	.18617
The hotel employee are training in statistical techniques.	Equal variances assumed	.486	.486	-.077	286	.939	-.01764	.22939	-.46914	.43386
	Equal variances not assumed			-.077	275.68	.938	-.01764	.22768	-.46586	.43058
The hotel held a monthly meeting for employee from different departments to discuss quality related suggestions.	Equal variances assumed	2.726	.100	.208	286	.835	.04497	.21595	-.38009	.47003
	Equal variances not assumed			.211	280.50	.833	.04497	.21294	-.37418	.46413
The hotel implement most	Equal variances assumed	.008	.928	-.004	286	.997	-.00088	.21571	-.42546	.42369

employee s' quality related suggestions	Equal variances not assumed			-.004	269.56	.997	-.00088	.21554	-.42525	.42348
The hotel departments managers create a work environment that encourages employee to perform to the best of their abilities	Equal variances assumed	2.776	.097	-1.108	286	.269	-.26455	.23866	-.73430	.20520
	Equal variances not assumed			-1.119	277.40	.264	-.26455	.23637	-.72986	.20076
The hotel is in contact with customers to be updated about their requirements	Equal variances assumed	2.312	.130	.315	286	.753	.07672	.24339	-.40235	.55579
	Equal variances not assumed			.311	255.23	.756	.07672	.24635	-.40841	.56185
The hotel is in contact with customers to update them about the new product	Equal variances assumed	.424	.515	1.039	286	.300	.23633	.22755	-.21155	.68421
	Equal variances not assumed			1.033	263.48	.302	.23633	.22870	-.21398	.68665
The hotel considers the customer requirements in the product design process	Equal variances assumed	1.673	.197	.832	286	.406	.19577	.23540	-.26758	.65911
	Equal variances not assumed			.824	258.00	.411	.19577	.23770	-.27231	.66385
The hotel top management study results of customer satisfaction surveys	Equal variances assumed	.288	.592	.995	286	.321	.23369	.23493	-.22873	.69610
	Equal variances not assumed			.992	265.86	.322	.23369	.23560	-.23019	.69756
The hotel has an effective process for resolving customer complaints in a timely manner	Equal variances assumed	4.808	.029	-.443	286	.658	-.11023	.24908	-.60050	.38004
	Equal variances not assumed			-.436	250.96	.663	-.11023	.25297	-.60844	.38798
The hotel strives to establish long-term relationships with high reputation supplier	Equal variances assumed	.071	.790	.705	286	.481	.13051	.18513	-.23388	.49490
	Equal variances not assumed			.706	270.84	.481	.13051	.18475	-.23322	.49424
The hotel provides supplier with a clear specification of the required products	Equal variances assumed	2.027	.156	.391	286	.696	.07143	.18250	-.28779	.43064
	Equal variances not assumed			.389	262.56	.698	.07143	.18357	-.29003	.43289
The hotel considers supplier capabilities in the product design process	Equal variances assumed	.148	.700	.042	286	.966	.00882	.20858	-.40173	.41936
	Equal variances not assumed			.042	272.44	.966	.00882	.20781	-.40029	.41793
The hotel displays quality	Equal variances assumed	1.034	.310	-.069	286	.945	-.01764	.25436	-.51829	.48302

data (defects and errors rates; control charts) at most of the departments	Equal variances not assumed			-.070	275.23	.944	-.01764	.25262	-.51494	.47967
The hotel uses quality data to evaluate employee performance	Equal variances assumed	.001	.972	-.119	286	.905	-.02998	.25215	-.52629	.46633
	Equal variances not assumed			-.119	268.63	.905	-.02998	.25218	-.52649	.46652
The hotel displays the progress towards quality related goals	Equal variances assumed	.265	.607	.210	286	.834	.05379	.25632	-.45071	.55830
	Equal variances not assumed			.209	264.80	.835	.05379	.25728	-.45277	.56036
The hotel employee receive standardized instructions about their tasks	Equal variances assumed	2.459	.118	1.120	286	.263	.28483	.25420	-.21551	.78518
	Equal variances not assumed			1.129	275.67	.260	.28483	.25232	-.21188	.78155
The hotel uses statistical techniques5 in order to reduce variance in processes	Equal variances assumed	.067	.796	1.690	286	.092	.42240	.24992	-.06952	.91431
	Equal variances not assumed			1.689	268.00	.092	.42240	.25012	-.07005	.91484
The hotel uses preventive maintenance system	Equal variances assumed	.326	.568	.432	286	.666	.10935	.25322	-.38907	.60776
	Equal variances not assumed			.430	264.77	.667	.10935	.25420	-.39116	.60985

4.3 Descriptive statistics

Descriptive statistics are employed in order to: explain the characteristics of the sample; assess each variable against some central tendency measures such as mean, median, and mode; variability (dispersion) measures of the data such as standard deviation, range of scores, and obtain some information concerning the distribution of scores (skewness, kurtosis and histograms shapes).

4.3.1 Respondents' characteristics

A total of 300 (130 five star hotels and 170 four star hotels) questionnaires were obtained from 4 main data collection methods that were used to collect the data (interviews (15), e-mails (15) – Mail (20) - DCS (250); see Figure 4.3. Twelve uncompleted questionnaires (six from four star hotels and six from five star hotels) are excluded leaving 288 usable questionnaires yielding a response rate of 75 % (see Figures 4.2 and 4.3)

Figure 4-2: Responses according to hotel category

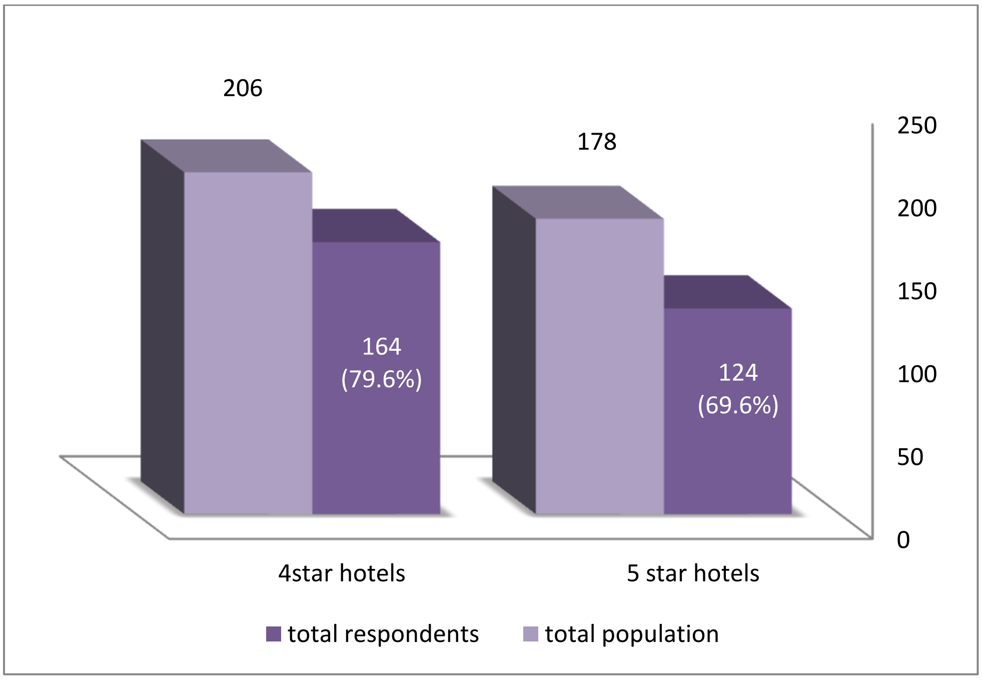
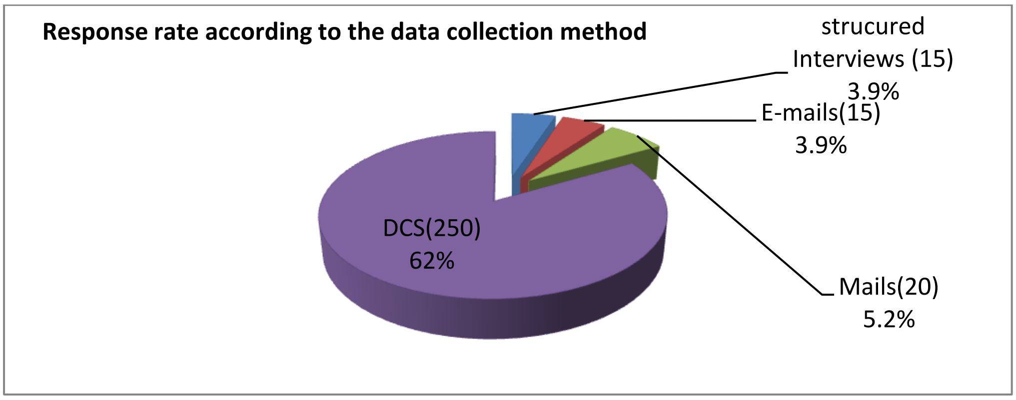


Figure 4-3: Responses rate according to the data collection method



All the questionnaires were completed by the hotel general managers in three main areas: 51 (17.8 %) from Greater Cairo; 119 (41.3%) from Sharm Elsheikh; and 118 (40.9%) from Red Sea (See Table 4.3). 80% of the investigated hotels are operated by international chains and 20% are independent.

Table 4-3: Responses according to hotel category and area

Area	Hotel category	Total number	Total responses	Uncompleted	Total valid responses
Greater Cairo	**5 star**	**34**	**33**	**0**	**33**
	4 star	18	18	0	18
Sharm Elsheikh	5 star	56	53	4	49
	4star	80	72	2	70
Red Sea	5 star	58	51	2	49
	4 star	78	73	4	69
Total		384	300	12	288 (75%)

4.3.2 Variables' central tendency, variability (dispersion) and distribution of scores

Variables from 1 to 22 are variables that measure quality management while variables 23 and 24 measure financial performance (see Table 4.6 for variables names). After excluding the 12 uncompleted questionnaires (as discussed in Section 3.4.1), the total number of usable questionnaires with no missing values is 288, as shown in Table 4.4. The minimum value (for variables from 1 to 22) is 0 which means that this quality management variable(s) (aspect) is not applicable, and the maximum value (for variables from 1 to 22) is 10 which mean that this quality management practices have been implemented for 10 years.

Table 4-4: Descriptive statistics for the research variables

	N		Central tendency measures				Variability (dispersion) measures				Distribution of scores measures			
	valid	**Missing**	**Mean**	**Median**	**5%trimmed mean**	**Mode**	**Std. Deviation**	**Minimum**	**Maximum**	**Range**	**Skewness**	**Std. error Skewness**	**Kurtosis**	**Std. error Kurtosis**
Variables that measure top management leadership QMPs														
Variable 1	288	0	5.79	5	5.77	5	1.86	2	10	8	.17	.144	-.75	.286
Variable 2	288	0	5.65	5	5.64	5	1.89	2	10	8	.11	.144	-.79	.286
Variable 3	288	0	5.80	6	5.82	5	1.93	1	10	9	-.07	.144	-.80	.286
Variables that measure Employee Management QMPs														
Variable 4	288	0	5.18	5	5.18	5	1.82	1	9	8	-.074	.144	-.85	.286
Variable 5	288	0	4.93	5	4.92	7	1.92	1	9	8	-.065	.144	-.98	.286
Variable 6	288	0	4.92	5	4.89	5	1.81	1	10	9	.169	.144	-.70	.286
Variable 7	288	0	4.85	5	4.84	5	1.81	0	10	10	-.027	.144	-.67	.286
Variable 8	288	0	4.95	5	4.96	7	2.00	0	10	10	.003	.144	-.89	.286
Variables that measure customer focus QMPs														
Variable 9	288	0	4.55	4.5	4.49	3	2.04	1	10	9	.346	.144	-.76	.286
Variable 10	288	0	4.54	4	4.50	3	1.91	1	10	9	.296	.144	-.61	.286
Variable 11	288	0	4.49	4	4.44	3	1.98	1	10	9	.372	.144	-.66	.286
Variable 12	288	0	4.39	4	4.32	3	1.97	1	10	9	.503	.144	-.40	.286
Variable 13	288	0	4.42	4	4.00	3	2.09	1	10	9	.397	.144	-.61	.286
Variables that measure supplier management QMPs														
Variable 14	288	0	2.01	2	1.94	1	1.55	0	7	7	.445	.144	-.66	.286
Variable 15	288	0	2.75	3	2.69	1	1.53	0	8	8	.456	.144	-.522	.286
Variable 16	288	0	2.64	2	2.58	1	1.75	0	7	7	.408	.144	-.718	.286
Variables that measure quality data and reporting QMPs														
Variable 17	288	0	3.20	3	3.16	5	2.13	0	8	8	.065	.144	-1.09	.286
Variable 18	288	0	3.27	3	3.25	1	2.11	0	9	9	.118	.144	-1.07	.286
Variable 19	288	0	3.29	3	3.26	2	2.15	0	8	8	.070	.144	-1.22	.286
Variables that measure process management QMPs														
Variable 20	288	0	4.53	5	4.52	5	2.14	0	10	10	.048	.144	-.927	.286
Variable 21	288	0	4.30	4	4.27	2	2.11	1	9	8	.134	.144	-1.09	.286
Variable 22	288	0	4.31	4	4.29	2	2.12	1	8	7	.085	.144	-1.18	.286
Variables that measure financial performance QMPs														
Variable 23	288	0	102006	88357	95651	33333	62867	2085	512500	510414	1.977	.144	6.911	.286
Variable 24	288	0	119849	101651	111168	36734	81057	2807	803921	801113	2.960	.144	17.794	.286

The mean values indicated that the most longstanding quality management practices in hotels are those that reflect top management leadership followed by practices that reflect employee management, practices that reflect customer focus, practices that reflect process management, practices that reflect quality data and reporting, and practices that reflect supplier management, in that order. The 5% trimmed mean values (for variables from 1 to 22) are close to the mean values which indicate that there is no high effect of extreme screes on the mean and that there is no problem with outliers. Descriptive statistics in Table 4.4 also provide some information about the standard deviation values (as a measure of dispersion). All standard deviation values (for variables from 1 to 22) are between 1.53 and 2.15 and indicate that the data are normally distributed and less concentrated around the mean and more spread. This is supported by the histogram shapes in Appendix 9.

Some information concerning the distribution of scores (skewness and kurtosis) is also in Table 4.4. These values are visually inspected and the results were as follows: most skewness values (except variables 3, 4, 5 and 7) are positive and close to zero (between 0.003 and 0.503), showing a very slight skew to the left hand side (see Appendix 9), while skewness values for variables 3,4,5, and 7 are negative and close to zero(between -0.027 and -0.074) which shows a very slight skew to the right hand side (see Appendix 9) . Additionally, all the kurtosis values (for variables from 1 to 22) are negative and roughly close to zero (between -0.522 and -0.98) which shows very slight flat shape with very few cases at the extreme. However, skewness and kurtosis are not in themselves formative but have to be converted to *z* score values to standardize them (discussed in section 3.7.1). Moreover, z score tests are very sensitive to large sample size of more than 200 cases (N is 288 in the current study). Therefore, it was recommended by Field (2006); Pallant (2007); Stevens (2009); and Tabachnick and Fidell (2007) to inspect the shape of the distribution (e.g. using a histogram, and Normal Q-Q Plot,) and visually look at the values of skewness and kurtosis statistics rather than calculate their significance.

The shapes of distributions are presented in Appendix 9. Reviewing Appendix 9 the first part in the right hand is the histogram shape, which shows the frequency distribution of the values of variables. The histogram for all variables from 1 to 22 shows an acceptable normal distribution curve, where there is regularly a pileup of values near the mean with values trailing away in both directions (Field, 2006; Stevens, 2009). This is supported by an inspection of the normal probability plots, which suggests a normal distribution, where a reasonably straight line is compared against the expected value from the normal distribution (Pallant 2007). Finally the boxplot diagram for all variables from 1 to 22 (except variable number 14 which has outliers with circles or attached numbers) shows no outliers with any out of range circles or attached numbers. However variables 23 and 24 boxplots and distribution shapes indicate that these two variables, which are employed to measure financial performance, have outliers and are not normally distributed. These results are extremely relevant since there is widespread agreement that financial data have outliers and are not normally distributed (Affleck-Graves and McDonald, 1989; Campbell et al., 1997; Dufour et al., 2003; Jondeau and Rockinger, 2003; Szego, 2002; Tokat et al., 2003; and Nicholas, 2007).

4.4 Multivariate analysis

In this section, several data analysis results are reported, such as (1) exploratory factor analysis (2) confirmatory factor analysis to test construct validity and dimensional structure of the QM construct, (3) SEM to test the causal direct/indirect relationship between QM and financial performance/competitive advantage.

4.4.1 Results of Exploratory Factor Analysis (EFA)

The results of EFA are presented following three main phases as explained in the in Section 3.5.2.1.1.

Step 1: Conditions necessary for EFA

All the necessary conditions for performing EFA are met, as discussed below:

First, the current study sample size is 288 and is sufficient to conduct EFA according to Tabachnick and Fidell (2007) (see Section 3.5.2.1.1 for more details). Second, an inspection of the correlation matrix (see Table 4.1) shows evidence of coefficients greater than 0.3 which means that the condition of factorability of R (strength of the inter-correlations among the items) is met (Pallant, 2007). Additionally, Bartlett's test of sphericity is significant which supports the factorability of the data set and implies the presence of non-zero correlation among the items and a high level of homogeneity among variables (Field, 2006). Bartlett's test of sphericity shows an approximate Chi square of 7022.1 with 231 df and significance 0.000 (see Table 4.5). The overall measure of sampling adequacy (KMO) is 0.949 which is higher than the cut-off point of 0.6 as recommended by Field (2006) and Hair et al. (2006). Overall, these data satisfy the fundamental requirements for factor analysis (Hair et al., 2006) (see Table 4.5).

Table 4-5: KMO and Battlet's test for EFA.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**.949**
Bartlett's Test of Sphericity	**Approx. Chi-Square**	**7022.102**
	df	**231**
	Sig.	**.000**

Third, as indicated in section 4.2.1., the assumptions concerning missing data and outliers are met.

Fourth, the results of data linearity, multicollinarity, and normality were satisfactory (see the preliminary analysis Section 4.2). Overall, these data satisfy the fundamental requirements for factor analysis.

Step 2: Factor extraction

The current study employed the two most common approaches for factor extraction, principal components and principal axis factors (Hair *et al.*,2006; and Tabachnic and Fidell 2007). Moreover, varimax orthogonal rotation is employed to get the best and the clearest solutions (as explained in Section 3.5.2.1.1). The above mentioned two approaches yield the same results, as shown in Tables 4.6 and 4.7. Kaiser's criterion (eigenvalue value of 1.0 or more), percentage of variance (satisfactory cut-off point is 60%), and scree plot (checking the plot to locate a point at which the shape of the curve changes path and becomes horizontal) are employed to assist in the decision regarding the number of factors to maintain including communalities (Tabachnick and Fidell, 2007; Pallant, 2007 ; and Hair et al., 2006).

Step 3: Interpretation of EFA results

The results of the EFA with principal components factor extraction methods are presented below. The results of the EFA with principal factor axis extraction methods can be visually inspected in Table 4.7 to provide more evidence and confidence to the yielded results.

The exploratory factor analysis produces a six-factor solution, representing: top management leadership, employee management customer focus, supplier management, process management and quality data and reporting. This is supported by the scree plot test and correspondence with the quality management literature. A six-factor structure is suggested using the criterion of an eigenvalue greater than 1 and the extracted factors account for 87.6% per cent of the total variance. Table 4.6 contains a summary of the descriptive statistics, factor analysis and reliability analysis for quality management. Factor loadings are all higher than 0.6 on their own factors as recommended by Hair et al. (2006). All the 22 items used in the questionnaire to measure the QM practices are retained and load highly on the expected factors (with no cross loading). This corresponds with the 'simple structure' view introduced by Thurstone (1947), where the researcher hopes to find each of the variables loading strongly on only one factor, and each factor being represented by a number of strongly loading variables.

More specifically, the factor loadings for the retained items are as follows: top management leadership (0.77, 0.77, and 0.75 respectively), employee management (0.83, 0.83, 0.82, 080, and 0.80 respectively), customer focus (0.84, 0.83, 0.82, 0.82, and 0.82 respectively), supplier management (0.84,0.80,.and 080 respectively), process management, (0.77,0.75, and 0.74 respectively) and quality data and reporting (0.81, 0.80, and 0.78 respectively) (See Table 4.6). However as previously explained (see Section 3.5.2.1.2 in the methodology chapter) EFA is a poor ending point for testing the scale dimensionality. Hence, confirmatory factor analysis is conducted (see the next section) to test the dimensional structure of the QM construct. Additionally, composite Cronbach Alpha value scores for the six factors reflect satisfactory internal consistency for those items. The reliability scores (Cronbach Alpha or α) of each construct (i.e. top management leadership, employee management, customer focus, supplier management, quality data and reporting, and process management) exceed 0.91 (see Table 4-6), which is above the usual cut-off level of 0.7 as recommended by Nunnally and Bernstein (1994). Moreover, the Corrected Item- Total Correlation (CITC) was used as one indicator of internal consistency among variables' items which reflects the degree of correlation between each item and the total score. CITC is used to evaluate whether all measures demonstrated a dominant loading on the hypothesised factor and did not have significant cross-loadings. The results of CITC ranged from 0.82 to 0.95. These results are satisfactory and are above the threshold of 0.4.as recommended by Nunnally and Bernstein (1994).

Table 4-6: Statistical summary: Descriptive statistics, Factor analysis (with Principal component as an extraction Method), and reliability analysis for quality management.

Factors and Variables	Descriptive Statistics		Factor Components &Loading						Reliability	
	M	S.D	1	2	3	4	5	6	CITC	α
Customer focus (CF)										**. 96**
CF1 The hotel is in contact with customers to be updated about their requirements	4.6	2.1	.84						.86	.95
CF2 The hotel is in contact with customers to update them about new products	4.5	1.9	.83						.88	.94
CF3 The hotel considers the customer requirements in the product design process	4.5	2.0	.82						.89	.95
CF4 The hotel top management study results of customer satisfaction surveys	4.4	2.0	.82						.87	.95
CF5 The hotel has an effective process for resolving customer complaints in a timely manner	4.4	2.1	.82						.87	.95
Employee Management (EM)										**.95**
EM1 All hotel departments are involved in quality management related activities	5.2	1.8		.83					.85	.94
EM2 The hotel employee are trained in statistical techniques (such as histograms and control charts, and regression analysis).	4.9	1.9		.83					.87	.94
EM3 The hotel holds a monthly meeting for employee from different departments to discuss quality related suggestions.	4.9	1.8		.82					.85	.94
EM4 The hotel implements most employee quality related suggestions	4.8	1.8		.80					.84	.94
EM5 The hotel department managers create a work environment that encourages employee to perform to the best of their abilities	4.9	2.0		.80					.86	.94

Supplier management (SM)					.84					**.91**
SM1 The hotel strives to establish long-term relationships with high reputation supplier	2.0	1.6			.80				.77	.90
SM2 The hotel provides supplier with a clear specification of the required products	2.8	1.5			.80				.85	.87
SM3 The hotel considers supplier capabilities in the product design process	2.7	1.8							.88	.83
Quality data and reporting (QD&R)										**.95**
QD1 The hotel displays quality data (defects and errors rates; control charts) in most departments	3.2	2.1				.81			.87	.94
QD2 The hotel uses quality data to evaluate employee performance	3.3	2.1				.80			.89	.92
QD3 The hotel displays progress towards quality related goals	3.3	2.2				.78			.92	.91
Top management leadership (TML)										**.95**
TML1 The hotel management provides the necessary financial resources to implement quality management related practices	5.8	1.9					.77		.85	.92
TML2 The hotel has an established quality planning process	5.7	1.9					.77		.88	.89
TML3 The hotel results (such as average occupancy and average daily rate, market share overall revenue and cost) are evaluated by comparing them to planned results	5.8	1.9					.75		.87	.90
Process management (PM)										**.95**
PM1 The hotel employee receive standardized instructions about their tasks	4.5	2.1						.77	.88	.93
PM2 The hotel uses statistical techniques5 in order to reduce variance in processes	4.3	2.1						.75	.89	.92
PM3 The hotel uses preventive maintenance system	4.3	2.1						.74	.89	.93
% of Cumulative variance			**20.2**	**40.2**	**52.7**	**64.8**	**76**	**87.6**		

Kaiser-Meyer-Olkin (KMO) Measure Sampling Adequacy **= 0.949** ***Bartlett test of sphericity = 7022.1 with df*** **231** ***Bartlett test, significance*** **= 0.000**

Note: CITC = Corrected Item-Total correlations, α = Cronbach's Alpha

Table 4-7: Statistical summary: Descriptive statistics, Factor analysis (with Principal Axis Factoring as an extraction Method). and reliability analysis for quality management.

Factors and Variables	Descriptive Statistics		Factor Components &Loading						Reliability	
	M	**S.D**	**1**	**2**	**3**	**4**	**5**	**6**	**CITC**	**α**
Customer focus (CF)										**.96**
CF1 The hotel is in contact with customers to be updated about their requirements	4.6	2.1	**.80**	.19	.14	.15	.22	.14	.86	.95
CF2 The hotel is in contact with customers to update them about new products	4.5	1.9	**.79**	.28	.13	.18	.16	.17	.88	.94
CF3 The hotel considers the customer requirements in the product design process	4.5	2.0	**.80**	.23	.19	.16	.22	.16	.89	.95
CF4 The hotel top management study results of customer satisfaction surveys	4.4	2.0	**.79**	.22	.20	.20	.18	.11	.87	.95
CF5 The hotel has an effective process for resolving customer complaints in a timely manner	4.4	2.1	**.79**	.29	.11	.17	.15	.14	.87	.95
Employee Management (EM)										**.95**
EM1 All hotel departments are involved in quality management related activities	5.2	1.8	.20	**.79**	.13	.18	.19	.14	.85	.94
EM2 The hotel employee are trained in statistical techniques (such as histograms and control charts, and regression analysis).	4.9	1.9	.22	**.80**	.12	.19	.17	.21	.87	.94
EM3 The hotel held a monthly meeting for employee from different departments to discuss quality related suggestions.	4.9	1.8	.24	**.77**	.18	.14	.18	.15	.85	.94
EM4 The hotel implements most employee s' quality related suggestions	4.8	1.8	.26	**.76**	.16	.14	.19	.15	.84	.94
EM5 The hotel department managers create a work environment that encourages employee	4.9	2.0	.26	**.80**	.18		.17	.11	.86	.94

to perform to the best of their abilities										
Supplier management (SM)										**.91**
SM1 The hotel strives to establish long-term relationships with high reputation supplier	2.0	1.6	.22	.17	**.69**	.17	.13	.15	.77	.90
SM2 The hotel provides supplier with a clear specification of the required products	2.8	1.5	.17	.16	**.79**	.24	.11	.27	.85	.87
SM3 The hotel considers supplier capabilities in the product design process	2.7	1.8	.16	.21	**.83**	.23	.17	.23	.88	.83
Quality data and reporting (QD&R)										**.95**
QD1 The hotel displays quality data (defects and errors rates; control charts) in most of departments	3.2	2.1	.26	.23		.81			.87	.94
QD2 The hotel uses quality data to evaluate employee performance	3.3	2.1	.25	.29	.29	**.73**	.14	.20	.89	.92
QD3 The hotel displays the progress towards quality related goals	3.3	2.2	.27	.24	.28	**.75**	.21	.16	.92	.91
Top management leadership (TML)					.24	**.80**	.17	.22		**0.95**
TML1 The hotel management provides the necessary financial resources to implement quality management related practices	5.8	1.9	.31	.31	.20	.23	**.69**	.16	.85	.92
TML2 The hotel has an established quality planning process	5.7	1.9	.31	.32	.16	.17	**.74**	.27	.88	.89
TML3 The hotel results (such as average occupancy and average daily rate, market share overall revenue and cost) are evaluated by comparing them to planned results	5.8	1.9	.34	.30	.16	.16	**.72**	.21	.87	.90
Process management (PM)										**.95**
PM1 The hotel employee receive standardized instructions about their tasks	4.5	2.1	.23	.25	.37	.22		**.70**	.88	.93
PM2 The hotel uses statistical techniques5 in order to reduce variance in processes	4.3	2.1	.26	.26	.34	.24		**.70**	.89	.92
PM3 The hotel uses preventive maintenance system	4.3	2.1	.25	.30	.32	.25		**.68**	.89	.93
% of Cumulative variance			**19.5**	**38.8**	**51.4**	**62.8**	**72.9**	**82.5**		

***Kaiser-Meyer-Olkin (KMO) Measure Sampling Adequacy* = 0.949 *Bartlett test of sphericity* = *7022.1 with df* 231 *Bartlett test, significance* = 0.000**

Note: CITC = Corrected Item-Total correlations, α = Cronbach's Alpha

4.4.2 Results of confirmatory factor analysis

Confirmatory factor analysis was employed in the current study for two main objectives: first, to test the validity of the measurement through the convergent and discriminant validity and second, to assess the factorial structure of the entire scale (Byrne, 2010). The latter is discussed below, while the former is discussed later in the current section.

4.4.2.1 Testing the dimensional structure of the measurement

The dimensional structure of quality measurement is tested through three models; Model (1) oblique factor model, Model (2) higher order factor model, and Model (3) one factor model (as discussed in Section 3.5.2.1.2). Without testing these three models, the researcher cannot assume that the significant correlation is a result of factors measuring the same construct (Rubio et al., 2001).

The assessment of the fit of each model followed a five stage process (model specification, model identification, model estimation, model evaluation, and model modification) as explained in the methodology chapter, Section 3.5.2.2. The model that best fitted the data is then assessed with regard to discriminant and convergent validity (measurement model).

Literature review conducted for the purpose of this study indicates that most scholars used CFA for construct validity only rather than to test the factorial structure of the quality management construct. In this study, three different models are subjected to CFA in SEM to find out the factorial structure of the quality management construct. The first model (multidimensional model) allowed the six constructs (predetermined from extensive review of the QM literature and the EFA results) to be freely correlated. In the second model (second order unidimensional model), the six dimensions are correlated to measure a higher order construct (single dimension), and finally the third model (unidimensional model) tests the possibility of the 22 items (that are used in the current study) to measure QM as a single factor (dimension). The results of these three models are compared to find out which one fitted the data better, in other words, whether QM is a multidimensional construct (model 1) or a unidimensional construct (model 2 or 3) .

All assumptions (i.e. adequate sample size, dealing with missing data and outlier, normality, linearity, multicollinearity and singularity) are met as indicated in Section 3.5.2.2.1.

Model 1: (oblique factor model)

The first model assumes that quality management is a six factor structure composed of *top management leadership (TML), employee management (EM), customer focus (CF), supplier management (SM), quality data and reporting (QD&R), and process management (PM).* It is presented schematically in Figure 4.4.

The CFA model presented in Figure 4.4, hypothesizes a priori that

1- Quality management (QM) can be explained by six factors: TML, EM, CF, SM, QD&R, and PM.

2- Each item-per measure has a nonzero loading on the QM factor that it was designed to measure (termed a *target loading*), and a zero loading on all other factors (termed *nontarget loadings*).

3- Measurement errors are uncorrelated.

The model results are presented in the following main sections: model specification and identification, model estimation, model evaluation, and model modification.

A- Model Specification and Identification (Model 1)

The structure models consist of the correlation among the six quality management latent constructs (top management leadership (TML), employee management (EM), customer focus (CF), supplier management (SM), quality data and reporting (QD&R), and process management (PM) (see research framework and hypotheses Section 2.3). These latent constructs were measured by using multi - item scales (see operationalization of the study constructs Section 3.2) which constitutes the measurement model section; each item has its related error term as shown in Figure 4.4.

In summary, there are 253 distinct sample moments (22(23)/2), or, in other words, elements in the sample covariance matrix (i.e. number of pieces of information provided by the data), and 59 parameters to be estimated (see model estimation below), thereby leaving 194 (253-59) degrees of freedom based on an overidentified model.

B- Model estimation (Model 1)

All the factors that can affect model estimation and often result in error messages (i.e. missing data, outliers, multicollinearity, nonnormality of data distributions) are considered and examined as discussed in Sections 4.2 and 4.4.1.

The data for the model was entered in AMOS v17 by using the ML estimation technique (see Section 3.5.2.2) and AMOS Graphic is used to draw the measurement and structural paths collectively in the model as shown in Figure 4.4.

There are 44 *regression weights*, 28 of which are fixed and 16 of which are estimated; the 28 fixed regression weights include the first of each set of six factor loadings and the 22 error terms. There are 15 *covariances* and 28 *variances*, all of which are estimated, as shown in Table 4.8.

Table 4-8: Parameter summary of QM first order CFA

	Weights	Covariance	Variances	Means	Intercepts	Total
Fixed	28	0	0	0	0	28
Labeled	0	0	0	0	0	0
Unlabeled	16	15	28	0	0	59
Total	44	15	28	0	0	87

A problem that may be encountered in CFA includes the estimation of parameters that are logically impossible such as a negative error variance (also named the Heywood case). Negative error variance is logically impossible as it implies a less than zero percent error in an item and more than 100 percent of the variance is explained. Additionally, an illogical standardized parameter estimation that exceeds **|1.0|** is theoretically impossible and probably indicates a problem in the data (Hair et al., 2006). As shown in Table 4.9 there is no negative error variance and no standardized parameter estimation exceeds the value of 1.00 in model 1.

Table 4-9: Selected AMOS Output for Hypothesized six-Factor CFA Model: Parameter Estimates (Model 1).

	Estimates/		S.E.	C.R.	P
	Regression Weight				
	Unstand.	Stand.			
X1 <------ TML	1.000	.89			
X2 <------ TML	1.059	.93	.043	24.502	***
X3 <------ TML	1.065	.91	.045	23.661	***
X4 <------ EM	1.000	.88			
X5 <------ EM	1.088	.90	.048	22.633	***
X6 <------ EM	1.005	.89	.046	21.813	***
X7 <------ EM	.992	.88	.047	21.121	***
X8 <------ EM	1.124	.90	.051	22.186	***
X9 <------ CF	1.000	.89			
X10 <------ CF	.954	.91	.040	23.673	***
X11 <------ CF	.997	.92	.041	24.317	***
X12 <------ CF	.978	.90	.042	23.199	***
X13 <------ CF	1.031	.90	.045	23.028	***
X14 <------ SM	1.000	.79			
X15 <------ SM	1.124	.91	.062	18.141	***
X16 <------ SM	1.351	.95	.070	19.291	***
X17 <------ QD&R	1.000	.90			
X18 <------QD&R	1.025	.93	.039	26.574	***
X19 <------ QD&R	1.069	.96	.037	28.647	***
X20 <------ PM	1.000	.92			
X21 <------ PM	1.001	.93	.036	27.960	***
X22 <------ PM	1.007	.93	.036	27.631	***
	Covariance				
	Covariance estimates	Correlation estimates			
TM <-------> EM	2.167	.681	.248	8.724	***
TML <-------> CF	2.282	.689	.260	8.788	***
TM <-------> SM	1.618	.548	.213	7.589	***
TML <-------> QD&R	2.262	.621	.270	8.384	***
TML <-------> PM	2.413	.689	.272	8.886	***
EM <-------> CF	2.099	.623	.256	8.195	***
EM <-------> SM	1.569	.522	.215	7.302	***
EM <-------> QD&R	2.251	.607	.273	8.237	***
EM <-------> PM	2.269	.637	.270	8.410	***
CF <-------> SM	1.577	.504	.220	7.153	***
CF <-------> QD&R	2.367	.613	.285	8.298	***
CF <-------> PM	2.282	.616	.277	8.233	***
QD&R <-------> PM	2.817	.691	.310	9.082	***
SM <-------> QD&R	2.256	.656	.255	8.844	***
SM <-------> PM	2.456	.744	.258	9.502	***

	Variance			
TML	2.757	.288	9.579	***
EM	2.563	.273	9.372	***
CF	3.302	.344	9.601	***
SM	1.526	.191	7.988	***
QD&R	3.713	.377	9.842	***
PM	3.859	.381	10.132	***
e1	.707	.079	8.976	***
e2	.493	.068	7.226	***
e3	.614	.076	8.094	***
e4	.761	.077	9.927	***
e5	.670	.073	9.192	***
e6	.696	.072	9.672	***
e7	.753	.076	9.944	***
e8	.786	.083	9.480	***
e9	.869	.087	9.968	***
e10	.653	.069	9.461	***
e11	.628	.069	9.138	***
e12	.741	.076	9.703	***
e13	.860	.088	9.808	***
e14	.890	.083	10.755	***
e15	.418	.054	7.723	***
e16	.275	.062	4.421	***
e17	.841	.088	9.582	***
e18	.576	.072	8.007	***
e19	.378	.065	5.826	***
e20	.709	.082	8.662	***
e21	.570	.073	7.797	***
e22	.601	.076	7.914	***

*** Probability < .000

C- Model Evaluation (Model 1)

The evaluation criteria focus on the adequacy of (a) the parameter estimates, and (b) the model as a whole.

First regarding the adequacy of parameter estimates, all the critical ratio (C.R.) values (parameter estimate divided by its standard error) in Table 4.9 are greater than 1.96, which indicates that all the estimates are statistically different from zero, and the null hypothesis (that the estimate equals 0.0, in other words, no relationship exists) can be rejected. Additionally, all the parameter estimates are positive and within the logical anticipated range of values (i.e. no negative values obtained and no correlations exceed the value of 1.00) (see Table 4.9). More specifically, the path coefficient from each latent construct to the observed indicators is significant ($P < 0.000$) and the standardized regression weight range from 0.79 to 0.96. As Bollen (1989) indicated, this supports the validity and reliability of the items. All covariances between the six latent construct are significant and the correlations range from 0.50 to 0.74, which is considered reasonable and reliable as well.

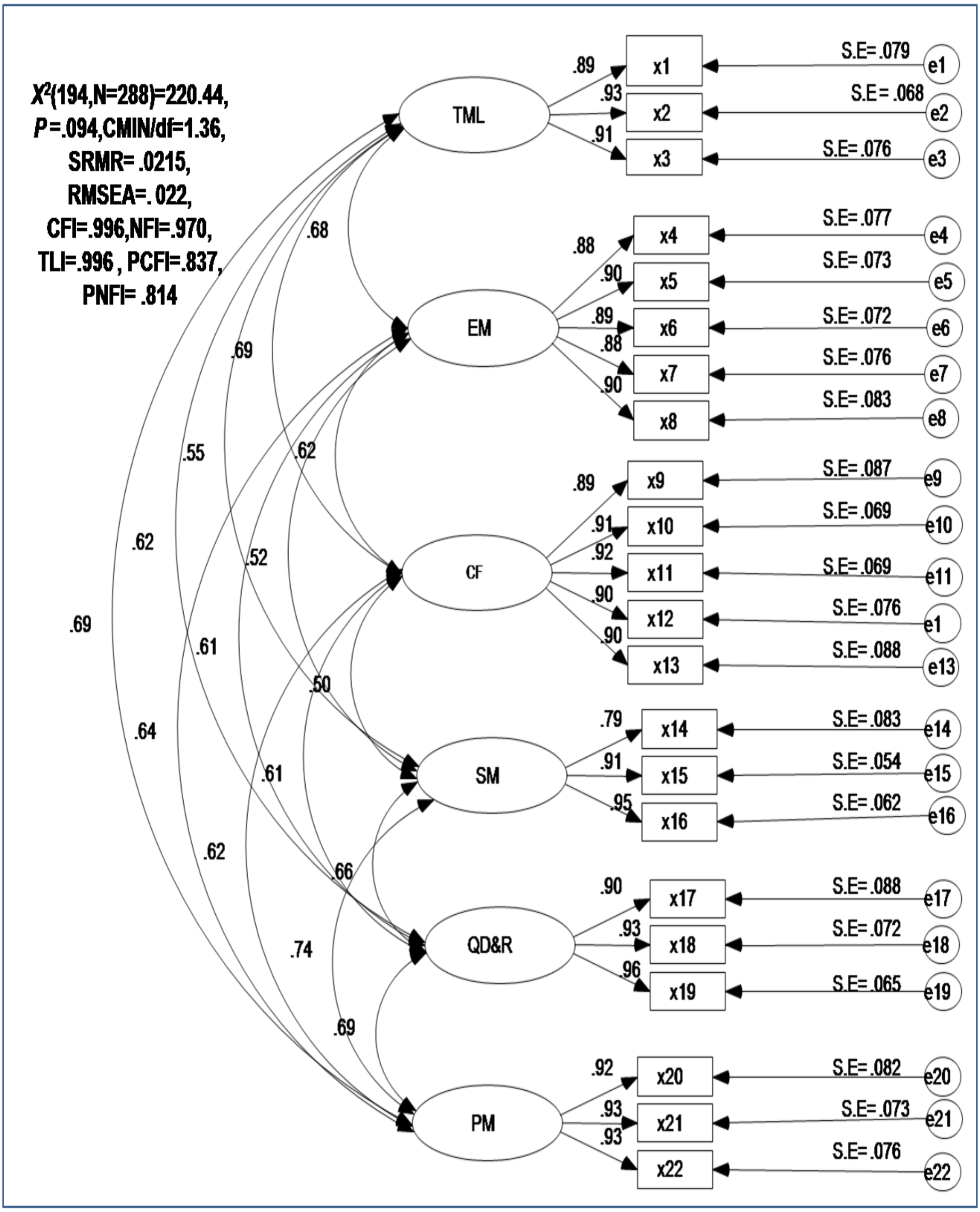
Second evaluating the model as a whole (Model 1)

In model 1, $\chi 2$ is 220.445 with 194 degrees of freedom and a probability (P*)* level equal to 0.094. This P- value is insignificant which means that there is no evidence to reject the null hypothesis (the model fits the data well). In other words, the $\chi 2$ GOF statistic shows that the actual observed covariance matrix (S) matches the estimated covariance matrix ($\sum$). However, because the chi-square value cannot be used alone, as it depends on sample size and will almost always be significant with large samples (Harrington, 2009), three alternative goodness –of- fit measures (absolute fit, incremental fit, and parsimony fit measures) are employed.

The fit indices of $\chi 2$/df, SRMR, and RMSEA, are used as measures of absolute fit; CFI , NFI , and TLI are used to assess incremental fit; while PCFI and PNFI are used to measure the parsimony fit as recommended by Bagozzi and Yi, (1988), Henry and Stone (1994), McKinney et al. (2002), Roh et al. (2005), Hair et al. (2006), Chow and Chan (2008), and Byrne (2010) (see Section 3.5.2.2. Table 4.9 presents the information on selected fit indices from the output used in the evaluation of the model.

In summary, the *CMIN*/df is 1.36 and is in an acceptable range according to the criterion ≤ 3 (Kline, 2011) and ≤ 5 (Bentler, 1989; Shumacker and Lomax, 2004; Chiu et al., 2006). Root Mean Square Error of Approximation (RMSEA) value is 0.022. This value is below the established cut-off value of 0.08, as recommended by Bagozzi and Yi (1988), Henry and Stone (1994), Hair et al. (2006), and Byrne (2010), which indicates that Model 1, with unknown but optimal parameter values, fits the population covariance matrix if it is available.

Figure 4-4: Model 1: first order CFA (oblique factor model)



TML: Top Management Leadership; EM: Employee Management; CF: Customers Focus; SM: Supplier Management; QD&R: Quality Data and Reporting; PM: Process Management; X1: X22 quality management items (aspects).

Additionally, the value of the standardized root mean square residual (SRMR) (0.0215) is below the established cut-off value of 0.05, as recommended by Hair et al. (2006), and Byrne (2010), which indicates a good model fit. SRMR is the standardized square root of the average squared amount by which the sample variances and covariance (S) differ from the estimated obtained variances and covariance (∑) under the assumption that the model is correct (Arbuckle, 2008).

Moreover, regarding the incremental fit measures, which assess how well the model fits relative to the null model, CFI, NFI, and TLI are 0.996 , 0.996, and 0.995 respectively, which exceed the cut-off value of 0.9, as recommended by Bentler (1990), Hair et al. (2006), Chow and Chan (2008) and Yang et al. (2008). Finally, PCFI and PNFI as measures for parsimony fit, inform which model among a set of competing models is the best, are 0.837 and 0.814. These values, are greater than the cut-off value of 0.5, as recommended by Hair et al. (2006) and Chow and Chan (2008). In conclusion, the goodness – of fit- measures indicate that Model 1 fits the data

d- Model modification (Model 1)

Given that all model fit indices are satisfactory, therefore there is no need to perform any *specification search* to obtain a better fitting of the hypothesized model to the observed sample variance-covariance matrix (Kline, 2011).

4.4.2.1.1 Model 2 (one higher order factor model)

The second model tests a higher factor order model, where the six factors are measures of one single attribute of quality management, as shown in Figure 4.5. The same number of indicators is used to measure each factor as in the first model. The only difference between this model and the previous model is that the factors are now correlated to be measures of one higher factor of quality management.

A- Model Specification and identification (Model 2)

The six quality management latent constructs (i.e. top management leadership (TML), employee management (EM), customer focus (CF), supplier management (SM), quality data and reporting (QD&R), and process management (PM)), form the structure models. These factors are in this model correlated because they are measuring one higher order dimension. These latent constructs are measured by using multi-item scales (see Section 3.1.) which constitutes the measurement model section; each item has its related error term as shown in Figure 4.5.

There are 253 distinct sample moments (22(23)/2), or, in other words, elements in the sample covariance matrix (i.e. number of pieces of information provided by the data), and 50 parameters to be estimated (see model estimation below), thereby leaving 203 (253-50) degrees of freedom based on an overidentified model.

B- Model estimation (Model 2)

All factors that affect model estimation and often result in error messages such as missing data, outliers, multicollinearity, nonnormality of data distributions are considered and examined as discussed in sections 4.2 and section 4.3.

The data for the model was entered in AMOS v17 by using the ML estimation technique (see Section 3.5.2.2) and AMOS Graphic is used to draw the measurement and structural paths collectively in the model as shown in Figure 4.5. There are 56 *regression weights*, 34 of which are fixed and 22 of which are estimated. There are 15 *covariances* and 28 *variances*, all of which are estimated, as shown in Table 4.10.

Table 4-10: Parameter summary of QM first order CFA

	Weights	Covariance	Variances	Means	Intercepts	Total
Fixed	34	0	0	0	0	28
Labeled	0	0	0	0	0	0
Unlabeled	22	15	28	0	0	59
Total	56	15	28	0	0	87

As shown in Table 4.11 there is no negative error variance and no standardized parameters estimation exceeds the value of 1.00 in Model 2.

Table 4-11: Selected AMOS Output for Hypothesized second -order CFA Model: Parameter Estimates

	Estimates/		S.E.	C.R.	P
	Regression Weight				
	Unstand.	**Stand.**			
TML ◄------ QM	1.439	.814	.099	14.526	***
EM ◄------ QM	1.381	.767	.103	13.358	***
CF ◄------ QM	1.420	.759	.108	13.173	***
SM ◄------ QM	1.267	.756	.092	13.710	***
QD&R ◄------ QM	1.653	.801	.110	15.061	***
PM ◄------ QM	1.712	.864	.106	16.095	***
X1 ◄------ TML	1.000	.89			
X2 ◄------ TML	1.058	.93	.043	24.506	***
X3 ◄------ TML	1.062	.91	.045	23.650	***
X4 ◄------ EM	1.000	.88			
X5 ◄------ EM	1.088	.91	.048	22.632	***
X6 ◄------ EM	1.005	.89	.046	21.821	***
X7 ◄------ EM	.992	.88	.047	21.094	***
X8 ◄------ EM	1.124	.90	.051	22.177	***
X9 ◄------ CF	1.000	.89			
X10 ◄------ CF	.954	.91	.040	23.658	***
X11 ◄------ CF	.997	.92	.041	24.302	***
X12 ◄------ CF	.979	.90	.042	23.219	***
X13 ◄------ CF	1.030	.90	.045	22.983	***
X14 ◄------ SM	1.000	.80			
X15 ◄------ SM	1.115	.90	.061	18.146	***
X16 ◄------ SM	1.354	.96	.070	19.293	***
X17 ◄------ QD&R	1.000	.90			
X18 ◄------ QD&R	1.025	.93	.039	26.496	***
X19 ◄------ QD&R	1.071	.96	.037	28.628	***
X20 ◄------ PM	1.000	.92			
X21 ◄------ PM	1.004	.93	.036	27.796	***
X22 ◄------ PM	1.011	.93	.037	27.538	***
Variance					
QM	1.000				
Var1	.932		.126	7.417	***
Var2	1.054		.133	7.916	***
Var3	1.402		.172	8.151	***
Var4	.657		.093	7.065	***
Var5	1.326		.167	7.948	***
Var6	.974		.146	6.670	***
e1	.698		.079	8.871	***
e2	.495		.069	7.179	***
e3	.621		.077	8.101	***
e4	.761		.077	9.923	***

e5	.669	.073	9.179	***
e6	.695	.072	9.653	***
e7	.755	.076	9.946	***
e8	.786	.083	9.477	***
e9	.870	.087	9.963	***
e10	.653	.069	9.450	***
e11	.628	.069	9.119	***
e12	.736	.076	9.678	***
e13	.865	.088	9.816	***
e14	.883	.083	10.671	***
e15	.439	.055	8.003	***
e16	.253	.063	4.023	***
e17	.848	.088	9.624	***
e18	.579	.072	8.020	***
e19	.370	.065	5.716	***
e20	.724	.083	8.725	***
e21	.569	.074	7.678	***
e22	.589	.076	7.721	***

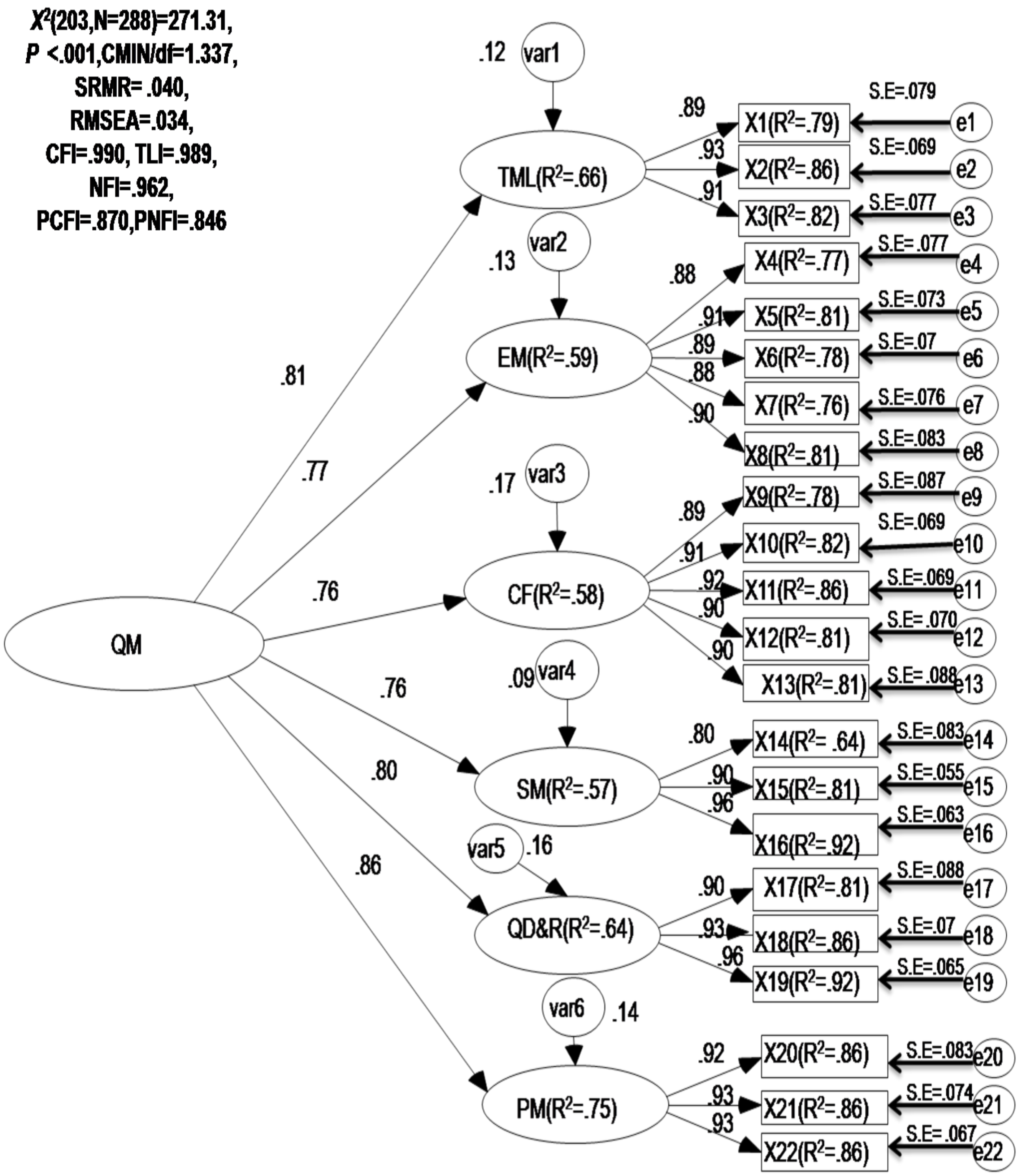
C- Model Evaluation (Model 2)

The evaluation criteria focus on the adequacy of (a) the parameter estimates, and (b) the model as a whole.

First regarding the adequacy of parameter estimates (See Table 4.11), all the critical ratio (C.R.) values (parameter estimate divided by its standard error) are greater than 1.96, which indicates that all the estimates are statistically different from zero, and there is evidence that the null hypothesis (that the estimate equals 0.0, in other words, no relationship exists) can be rejected.

All the parameter estimates are positive and within the logical anticipated range of values (i.e. no negative values were obtained and no correlations exceed the value of 1.00) (see Table 4.11). More specifically, the path coefficient from each latent construct to the observed indicators is significant and the standardized regression weights range from 0.75 to 0.96, which supports the validity and reliability of the items.

Figure 4-5: Model 2: second order CFA (higher order factor model)



QM: quality management; TML: Top Management Leadership; EM: Employee Management; CF: Customers Focus; SM: Supplier Management; QD&R: Quality Data and Reporting; PM: Process Management; X1: X22 quality management items (aspects).

In model 2, $\chi 2$ value is 271.31, with $P<0.001$ .This P- value is significant which means that there is evidence to reject the null hypothesis (model fits the data well) is rejected. However, the other goodness – of fit- measures indicate that Model 2 fits the data well, $\chi 2$ (203, *N*= 288) = 271.31, $P<0.001$ (Normed $\chi 2$ *=1.336, SRMR=0.040, RMSEA=0.034, CFI=0.990, NFI=0.962, and TLI=0.989, PCFI=0.870, and PBFI=0.846).* The GOF in Table 4.14 provide evidence that Model 2 produced a worse fit of the data to the hypothesized model than in Model 1.

4.4.2.1.2 Model 3 (One factor model)

The third model (unidimensional model) in Figure 4.6, tests the possibility of the 22 items that are used in the current study to measure QM practices forming a single factor.

A- Model Specification and identification (Model 3)

Model 3 structure part consist of 22 items that are used to measure quality management as a latent construct (to form one single construct), where each item has its related error term as shown in Figure 4.6. In summary, there are 253 distinct sample moments, or, in other words, elements in the sample covariance matrix (i.e. number of pieces of information provided by the data), and 44 parameters to be estimated, thereby leaving 209 (253-44) degrees of freedom based on an overidentified model.

B- Model estimation (Model 3)

All the factors that affect model estimation and often result in error messages (i.e. missing data, outliers, multicollinearity, nonnormality of data distributions) are considered and examined in Sections 4.2 and 4.3.

The data for the model is entered in AMOS v17 by using the ML estimation technique (see Section 3.5.2.2) and AMOS Graphic is used to draw the measurement and structural paths collectively in the model as shown in Figure 4.6.
There are 44 *regression weights*, 23 of which are fixed and 21 of which are estimated. There are 23 *variances,* all of which are estimated, as shown in Table 4.12.

Table 4-12: Parameter summary of QM as one single factor CFA

	Weights	Covariance	Variances	Means	Intercepts	Total
Fixed	23	0	0	0	0	23
Labeled	0	0	0	0	0	0
Unlabeled	21	0	23	0	0	44
Total	44	0	23	0	0	67

As shown in Table 4.13 there is no negative error variance and no standardized parameters estimation exceeds the value of 1.00 in model 3.

Table 4-13: Selected AMOS Output for Hypothesized QM as one single factor: Parameter Estimates

	Estimates		S.E.	C.R.	P
	Regression Weight				
	Unstandardized	Standardized			
X1 ← - - - - - QM	1.000	.770			
X2 ← - - - - - QM	1.023	.773	.071	14.411	***
X3 ← - - - - - QM	1.034	.765	.073	14.222	***
X4 ← - - - - - QM	.915	.719	.071	12.972	
X5 ← - - - - - QM	1.008	.750	.074	13.649	***
X6 ← - - - - - QM	.958	.757	.069	13.813	***
X7 ← - - - - - QM	.935	.740	.070	13.436	***
X8 ← - - - - - QM	1.044	.745	.077	13.553	***
X9 ← - - - - - QM	1.042	.731	.079	13.229	
X10 ← - - - - - QM	1.028	.770	.073	14.058	***
X11 ← - - - - - QM	1.072	.777	.075	14.242	***
X12 ← - - - - - QM	1.041	.755	.076	13.740	***
X13 ← - - - - - QM	1.096	.751	.080	13.638	***
X14 ← - - - - - QM	.659	.608	.062	10.689	
X15 ← - - - - - QM	.704	.658	.060	11.672	***
X16 ← - - - - - QM	.853	.698	.068	12.520	***
X17 ← - - - - - QM	1.091	.732	.082	13.244	
X18 ← - - - - - QM	1.135	.768	.081	14.056	***
X19 ← - - - - - QM	1.150	.766	.082	13.982	***
X20 ← - - - - - QM	1.143	.766	.082	13.960	
X21 ← - - - - - QM	1.165	.792	.080	14.567	***
X22 ← - - - - - QM	1.190	.802	.080	14.803	***
Variance					
QM	2.051		.267	7.673	
e1	1.412		.125	11.282	***
e2	1.442		.128	11.249	***
e3	1.550		.137	11.285	***
e4	1.607		.141	11.380	***
e5	1.619		.144	11.259	***
e6	1.400		.125	11.247	***
e7	1.482		.131	11.319	***
e8	1.789		.159	11.279	***
e9	1.945		.172	11.284	***

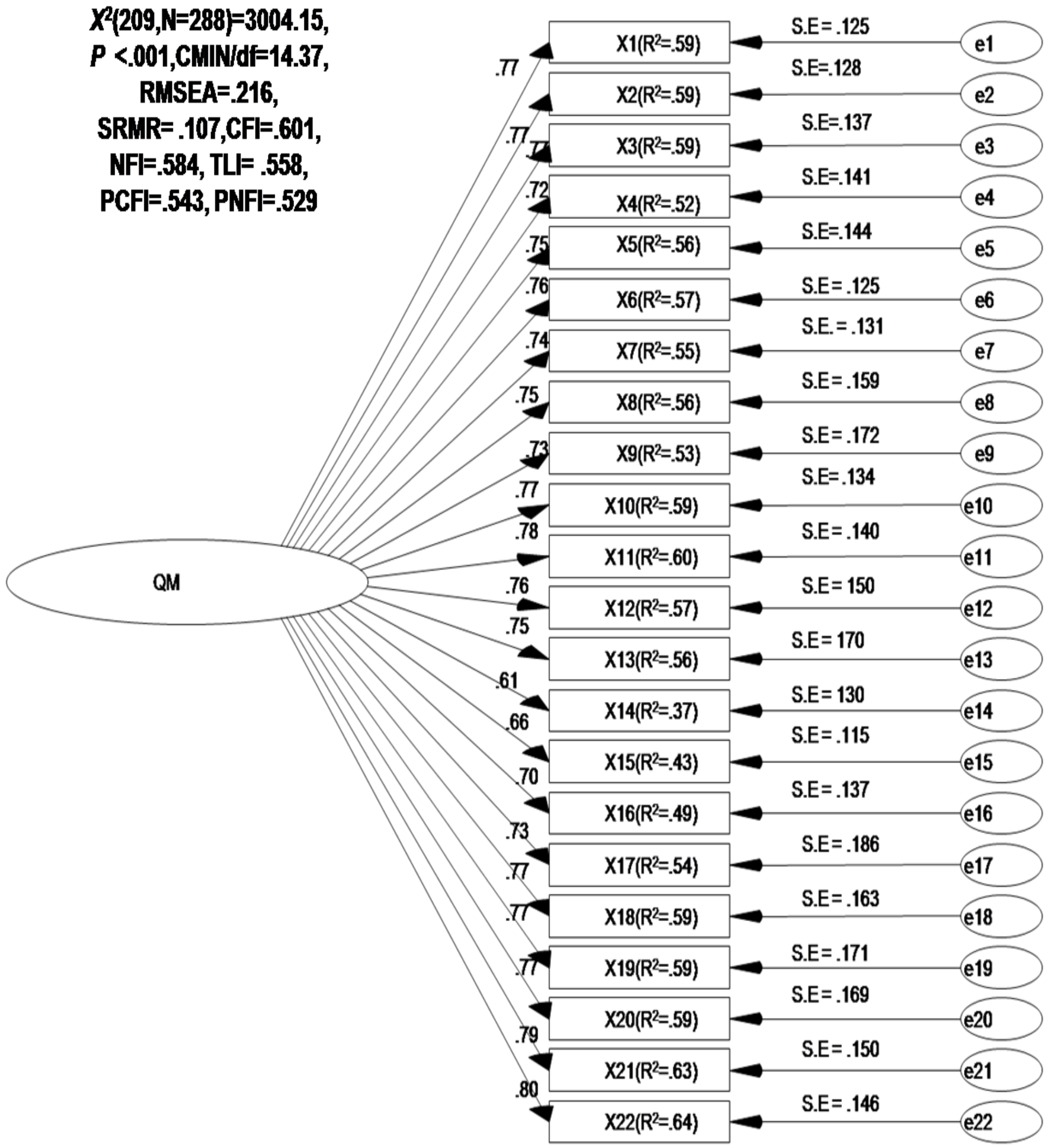
e10	**1.491**	**.134**	**11.119**	*******
e11	**1.552**	**.140**	**11.068**	*******
e12	**1.676**	**.150**	**11.185**	*******
e13	**1.907**	**.170**	**11.204**	*******
e14	**1.525**	**.130**	**11.696**	*******
e15	**1.329**	**.115**	**11.555**	*******
e16	**1.568**	**.137**	**11.460**	*******
e17	**2.112**	**.186**	**11.366**	*******
e18	**1.834**	**.163**	**11.228**	*******
e19	**1.914**	**.171**	**11.224**	*******
e20	**1.888**	**.169**	**11.169**	*******
e21	**1.655**	**.150**	**11.041**	*******
e22	**1.609**	**.146**	**10.987**	*******

c- Model Evaluation (Model 3)

First, regarding the adequacy of parameter estimates (see Table 4.13), all the critical ratio (C.R.) values (parameter estimate divided by its standard error) are greater than 1.96, which indicates that all the estimates are statistically different from zero, and there is evidence that the null hypothesis (that the estimate equals 0.0, in other words, no relationship exists) can be rejected. Additionally, all the parameter estimates are positive and within the logical anticipated range of values (i.e. no negative values obtained and no correlations exceed the value of 1.00) (see Table 4.13). More specifically, the path coefficient from each indicator to the single factor is significant and the standardized regression weights range from 0.6 to 0.8, which supports the validity and reliability of the items.

The goodness – of fit- measures indicate that model 3 does not fit the data well, $\chi2$ (209, *N*=288) =3004.115, P<0.001 (Normed $\chi2$ *=14.37, SRMR=0.1077, RMSEA=0.216, CFI=0.60, NFI=0.584, and TLI=0.558, PCFI=0.543, and PNFI=0.529).*

Figure 4-6: Model 3: one single factor model (one factor model)



QM: Quality Management
X1: X22 quality management items (aspects)

By comparing the summary of the GOF measures of the three previously described models presented in Table 4.14, it can be concluded that model one, which allows the six factors to freely correlate to form a multidimensional construct, is the model that best fits the data. More specific, the $\chi 2$ value of Model 1 is insignificant, which means that there is no evidence to reject the null hypothesis (model fit the data well), but the $\chi 2$ values in Model 2 and 3 is significant which give an evidence that the null hypothesis (model fit the data well) in these two models is rejected. However, because the $\chi 2$ value almost affected by the sample size, other GOF are employed. These GOF measure as shown in Table 4.14 provide evidence that Model 1 GOF are better than the same GOF in Model 2 and 3. Therefore, based on clear statistical evidence QM can be considered and employed in the current study as a multidimensional construct to find out which practices of QM give the firm-hotel- a competitive advantage over its rivals. The next step is to evaluate the measurement model (of the model that best fits the data which is Model 1) for convergent and discriminant validity.

Table 4-14: Model 1, 2, and 3 GOF measures

models	***X2(df), probability level***	**Normed *X2* CMIN/df**	**SRMR**	**RMSEA**	**CFI**	**NFI**	**TLI**	**PCFI**	**PNFI**
Oblique Factor mode: Model 1	220.44(194),*p* =.094	1.136	.0215	.022	.996	.970	.996	.837	.814
One-Higher order factor model: Model 2	271.31(203),*p* <.001	1.337	.040	.034	.990	.962	.989	.870	.846
One factor model : Model 3	3004.15(209), *p*<.001	14.37	.107	.216	.601	.584	.558	.543	.529

4.4.2.2 Testing the validity of the measurement

The second aim of employing CFA in the current study is to test the factor loadings of each observed variable on the latent variable (Byrne, 2010). This permits for the assessment of the constructs in terms of convergent validity, and discriminant validity (Hair et al., 2006, Kline, 2011). The results of convergent and discriminant validity for each factor as presented below:

4.4.2.2.1 Convergent validity

As indicated in Section 35.2.1.2, three criteria are used to assess the convergent validity of each factor in Model 1 (QM as a multidimensional construct): (1) factor loadings should be greater than 0.5 or higher and ideally 0.7 or higher, (2) composite reliability (CR) should be above 0.7 and ideally 0.8 or higher, (3) average variance extracted (AVE) supposed to be above the cut-off- value of 0.5 or higher. The standardized factor loadings of manifest variables onto construct and their error variances are tested to determine whether they meet the above three criteria or not. The results are presented in six tables (see Tables 4.15, 4.16, 4.17, 4.18, 4.19, 4.20) represent the six factors that reflect quality management practices (total management leadership, employee management, customer focus, supplier management, quality data and reporting, and process management). Each table highlights a particular construct and its related indicators with their respective factor loading (FL), standard error (SE), critical ratio (C.R.) and variance extracted (R^2); and the associated error with its standard error and critical ratio as follows.

<u>TML convergent validity</u>

Table 4.15 presents selected data from the AMOS output relating to the construct of top management leadership. The data indicate that, there is no negative error variance and no standardized parameter estimation exceeds the value of one, which indicates that there is no estimation problem and no identification problem related to negative variances as well.

Table 4-15: Selected AMOS output relating to TML construct

TML variables	FL	U.Est.	SE	CR***	Err.	E.Est.	SE	CR***
TML ←-- TML 1	0.89	1.00			e1	0.70	0.079	8.976***
TML ←-- TML 2	0.93	1.05	0.043	24.5***	e2	0.49	0.068	7.226***
TML ←-- TML 3	0.91	1.06	0.045	23.6***	E3	0.61	0.076	8.094***

TML: total management leadership; TML1- TML 3: the variables that were used in the current study to measure TML quality management construct ; FL-Factor loading, U.Est. : Unstandardized regression estimates; SE: standard error, CR : Critical Ratio, E.Est.: error variance estimates; *** P<0.001

$$\text{TML Composite reliability} = \frac{(.89+.93+.91)^2}{(.89+.93+.91)^2 + (.70+.49+.61)} = 0.805$$

$$\text{TML Average variance extracted (AVE):} \quad \frac{.89+.93+.91}{3} = 0.91$$

The indicator TML1 has a fixed regression weight of 1.00 resulting in no associated standard error or critical ratio. The critical ratios associated with the other indicators are all significant at the 0.001 level. With respect to the previously mentioned three criteria of convergent validity, the TML construct meets all of them. More specifically, all the factor loading values exceed the cut - off point 0.7 (range from 0.89:0.93) which shows a high degree of a positive relationship among scale items developed to measure TML. Secondly, the composite reliability value (0.805) is above 0.8 which gives evidence that the heterogeneous (but similar) indicators that measure TML have an overall good reliability. Thirdly, the average variance extracted value (0.91) exceeds the cut off value of 0.5, which reflects a good overall amount of variance in the manifest variables accounted for by the latent construct. Overall, TML convergent validity results confirm that measures of TML that should be theoretically related are in reality related.

Employee management convergent validity

Table 4.16 illustrates selected data from the AMOS output relating to the construct of employee management. The data indicate that, there is no negative error variance and no standardized parameter estimation exceeds the value of one, which indicates that there is no estimation problem and no identification problem related to negative variances as well.

Table 4-16: Selected AMOS output relating to EM construct

EM variables	FL	U.Est.	SE	CR***	Err.	E.Est.	SE	CR***
EM ←-- EM 1	0.88	1.00			E1	0.76	0.077	9.927***
EM ←-- EM 2	0.90	1.08	0.048	22.63***	E2	0.67	0.073	9.191***
EM ←-- EM 3	0.89	1.00	0.046	21.81***	E3	0.69	0.072	9.672***
EM ←-- EM 4	0.88	.992	0.047	21.12***	E4	0.75	0.076	9.944***
EM ←-- EM 5	0.90	1.24	0.051	22.18***	E5	0.78	0.083	9.480***

EM: employee management; EM1- EM5: the variables that were used in the current study to measure EM quality management construct ; FL-Factor loading, U.Est. : Unstandardized regression estimates; SE: standard error, CR : Critical Ratio, E.Est.: error variance estimates; *** P<0.001

EM Composite reliability: $$\frac{(.88+.90+.89+.88+.90)^2}{(.88+.90+.89+.88+.90)^2+(.76+.67+.69+.75+.78)} = 0.834$$

EM Average variance extracted (AVE) : $$\frac{.88+.90+.89+.88+.90}{5} = 0.89$$

The indicator EM1 has a fixed regression weight of 1.00 resulting in no associated standard error or critical ratio. The critical ratios associated with the other indicators are all significant at the 0.001 level. With respect to the previously mentioned three criteria of convergent validity, the EM construct meets all of them. More specifically, all the factor loading values exceed the cut - off point 0.7 (range from 0.88:0.90) which shows a high degree of a positive relationship among scale items developed to measure EM. Secondly, the construct reliability value (0.834) is above 0.8 which gives evidence that the heterogeneous (but similar) indicators that measure EM have an overall good reliability. Thirdly, the average variance extracted value (0.89) exceeds the cut off value of 0.5, which reflects a good overall amount of variance in the manifest variables accounted for by the latent construct. Overall, EM convergent validity results confirm that measures of EM that should be theoretically related are in reality related.

Customer focus convergent validity

Table 4.17, illustrates selected data from the AMOS output relating to the construct of employee management. The data indicate that, there is no negative error variance and no standardized parameter estimation exceeds the value of one, which indicates that there is no estimation problem and no identification problem related to negative variances as well.

Table 4-17: Selected AMOS output relating to CF construct

CF variables	FL	U.Est.	SE	CR***	Err.	E.Est.	SE	CR***
CF ← - - CF 1	.89	1.000			E1	.86	.087	9.968***
CF ← - - CF 2	.91	.954	.040	23.673***	E2	.65	.069	9.461***
CF ← - - CF 3	.92	.997	.041	24.317***	E3	.62	.069	9.138***
CF ← - - CF 4	.90	.978	.042	23.199***	E4	.74	.076	9.703***
CF ← - - CF 5	.90	1.031	.045	23.028***	E5	.86	.088	9.808***

CF: customer focus; CF1- CF5: the variables that were used in the current study to measure customer focus quality management construct ; - FL-Factor loading, U.Est. : Unstandardized regression estimates; SE: standard error, CR : Critical Ratio, E.Est.: error variance estimates; *** P<0.001

$$\text{CF Composite reliability} = \frac{(.89+.91+.92+.90+.90)^2}{(.89+.91+.92+.90+.90)^2+(.86+.73+.63+.65+.85)} = 0.845$$

$$\text{CF Average variance extracted (AVE)} = \frac{.89+.91+.92+.90+.90}{5} = 0.904$$

The indicator CF1 has a fixed regression weight of 1.00 resulting in no associated standard error or critical ratio. The critical ratios associated with the other indicators are all significant at the 0.001 level. With respect to the previously mentioned three criteria of convergent validity, the CF construct meets all of them. More specifically, all the factor loading values exceed the cut - off point 0.7 (range from 0.89:0.92) which shows a high degree of a positive relationship among scale items developed to measure CF. Secondly, the construct reliability value (0.845) is above 0.8 which gives evidence that the heterogeneous (but similar) indicators that measure CF have an overall good reliability. Thirdly, the average variance extracted value (0.904) exceeds the cut off value of 0.5, which reflects a good overall amount of variance in the manifest variables accounted for by the latent construct. Overall, CF convergent validity results confirm that measures of CF that should be theoretically related are in reality related.

Supplier management construct convergent validity

Table 4.18 illustrates selected data from the AMOS output relating to the construct of employee management. The data indicate that, there is no negative error variance and no standardized parameter estimation exceeds the value of one which indicates that there is no estimation problem and no identification problem related to negative variances as well.

Table 4-18: Selected AMOS output relating to SM construct

SM variables	**FL**	**U.Est.**	**SE**	**CR*** **	**Err.**	**E.Est.**	**SE**	**CR*** **
SM ←-- SM 1	.79	1.000			E3	.89	.083	10.755***
SM ←-- SM 2	.91	1.124	.062	18.141***	E2	.41	.054	7.723***
SM ←-- SM 3	.95	1.351	.070	19.291***	E1	.27	.062	4.421***

SM: supplier management; SM1- SM3: the variables that were used in the current study to measure supplier management quality management construct ; FL-Factor loading, U.Est. : Unstandardized regression estimates; SE: standard error, CR : Critical Ratio, E.Est.: error variance estimates; *** P<0.001

$$\text{SM Composite reliability} = \frac{(.79+.91+.95)^2}{(.79+.91+.95)^2 + (.89+.41+.27)} = 0.817$$

$$\text{SM Average variance extracted (AVE)} = \frac{.79+.91+.95}{3} = 0.883$$

The indicator SM1 has a fixed regression weight of 1.00 resulting in no associated standard error or critical ratio. The critical ratios associated with the other indicators are all significant at the 0.001 level. With respect to the previously mentioned three criteria of convergent validity, the SM construct meets all of them. More specifically, all the factor loading values exceed the cut - off point 0.7 (range from 0.79:0.95) which shows a high degree of a positive relationship among scale items developed to measure SM. Secondly, the construct reliability value (0.817) is above 0.8, which gives evidence that the heterogeneous (but similar) indicators that measure SM have an overall good reliability. Thirdly, the average variance extracted value (0.883) exceeds the cut off value of 0.5, which reflects a good overall amount of variance in the manifest variables accounted for by the latent construct. Overall, SM convergent validity results confirm that measures of SM that should be theoretically related are in reality related.

Quality data and reporting construct convergent validity

Table 4.19 illustrates selected data from the AMOS output relating to the construct of employee management. The data indicate that, there is no negative error variance and no standardized parameter estimation exceeds the value of one which indicates that there is no estimation problem and no identification problem related to negative variances as well.

Table 4-19: Selected AMOS output relating to QD&R construct

QD&R variables	FL	U.Est.	SE	CR***	Err.	E.Est.	SE	CR***
QD&R ←--QD&R1	.90	1.000			E3	.84	.088	9.582***
QD&R ←--QD&R 2	.93	1.025	.039	26.574***	E2	.57	.072	8.007***
QD&R ←--QD&R 3	.96	1.069	.037	28.647***	E1	.37	.065	5.826***

QD&R: quality data and reporting ; QD&R 1- QD&R 3: the variables that were used in the current study to measure QD&R quality management construct ; FL-Factor loading, U.Est. : Unstandardized regression estimates; SE: standard error, CR : Critical Ratio, E.Est.: error variance estimates; *** P<0.001

$$\text{QD\&R Construct reliability} = \frac{(.90+.93+.96)^2}{(.90+.93+.96)^2 + (.84+.57+.37)} = 0.813$$

$$\text{QD\&R Average variance extracted (AVE)} = \frac{(.90+.93+.96)}{3} = 0.93$$

The indicator QD&R1 has a fixed regression weight of 1.00 resulting in no associated standard error or critical ratio. The critical ratios associated with the other indicators are all significant at the 0.001 level. With respect to the previously mentioned three criteria of convergent validity, the QD&R construct meets all of them. More specifically, all the factor loading values are exceeding the cut - off point 0.7 (range from 0.90:0.96) which shows a high degree of a positive relationship among scale items developed to measure QD&R. Secondly, the construct reliability value (0.813) is above 0.8, which gives evidence that the heterogeneous (but similar) indicators that measure QD&R have an overall good reliability. Thirdly, the average variance extracted value (0.93) exceeds the cut off value of 0.5, which reflects a good overall amount of variance in the manifest variables accounted for by the latent construct. Overall, QD&R convergent validity results confirm that measures of QD&R that should be theoretically related are in reality related.

Process management construct convergent validity

Table 4.20, illustrates selected data from the AMOS output relating to the construct of employee management. Consistent with Table 4.20, there is no negative error variance and no standardized parameters estimation exceeds the value of one which indicates that there is no estimation problem and no identification problem related to negative variances as well.

Table 4-20: Selected AMOS output relating to PM construct

PM variables	**FL**	**U.Est.**	**SE**	**CR*****	**Err.**	**E.Est.**	**SE**	**CR*****
PM ← - - PM 1	.92	1.000			E1	.70	.082	8.662***
PM ← - - PM 2	.93	1.001	.036	27.960***	E2	.57	.073	7.797***
PM ← - - PM 3	.93	1.007	.036	27.631***	E3	.60	.076	7.914***

PM: process management; PM 1- PM 3: the variables that were used in the current study to measure PM quality management construct ; FL-Factor loading, U.Est. : Unstandardized regression estimates; SE: standard error, CR : Critical Ratio, E.Est.: error variance estimates; *** P<0.001

$$\text{PM Construct reliability} = \frac{(.92+.93+.93)^2}{(.90+.93+.96)^2 + (.70+.57+.60)} = 0.805$$

$$\text{PM Average variance extracted (AVE)} = \frac{.92+.93+.93}{3} = 0.926$$

The indicator PM1 has a fixed regression weight of 1.00 resulting in no associated standard error or critical ratio. The critical ratios associated with the other indicators are all significant at the 0.001 level. With respect to the previously mentioned three criteria of convergent validity, the PM construct meets all of them. More specifically, all the factor loading values exceed the cut - off point 0.7 (range from 0.92:0.93) which, shows a high degree of a positive relationship among scale items developed to measure PM. Secondly, the construct reliability value (0.805) is above 0.8, which gives evidence that the heterogeneous (but similar) indicators that measure PM have an overall good reliability. Thirdly, the average variance extracted value (0.926) exceeds the cut off value of 0.5, which reflects a good overall amount of variance in the manifest variables accounted for by the latent construct. Overall, PM convergent validity results confirm that measures of PM that should be theoretically related are in reality related.

4.4.2.2.2 Discriminat validity

Discriminant validity of the current study constructs was tested by comparing the average variance-extracted (AVE) value for any two constructs with the square of the correlation estimates between the same two constructs. The variance extracted estimates should be greater than the squared correlation estimates to have evidence of discriminant validity (as explained in Section 3.5.2.1.2).

Table 4.21, illustrates the standardized AMOS output of construct correlation matrix which are then squared and presented in Table 4.22. Moreover Table 4.22 contains the average variance extracted (AVE) for top management leadership (TML), employee management (EM), customer focus (CF), supplier management (SM), quality data and reporting (QD&R), and process management (PM). In the current study, the discriminant validity of those six constructs was confirmed.

Table 4-21: Amos output for the construct correlation matrix (standardized)

construct	α	(TML)	(EM)	(CF)	(SM)	(QD&R)	(PM)
TML	.94	1					
EM	.95	0.68***	1				
CF	.96	0.68***	0.62***	1			
SM	.91	0.54***	0.52***	0.50***	1		
QD&R	.95	0.62***	0.60***	0.613***	0.65***	1	
PM	.95	0.68***	0.63***	0.61***	0.744***	0.69***	1

***Correlation is significant at the 0.00 level (2-tailed), α= Composite Cronbach Alpha.
* TML=total management leadership; EM =employee management; CF= customer focus; SM= supplier management; QD&R= quality data and reporting; PM= process management

More specifically, in assessing discriminant validity between TML and EM, the average variance extracted of TML is 0.91, which is greater than the squared correlation matrix value between the two constructs (TML and EM) which is 0.64 (see Table 4.22). This confirms the discriminant validly between them. In other words, this indicates that each construct shares more variance with its relevant items than it shares with other constructs. Likewise, in the assessment of discriminant validity between EM and CF, the average variance extracted of EM is 0.89, which is greater than the squared correlation matrix value between the two constructs (EM and CF), which is 0.38 (see Table 4.22). This indicates satisfactory discriminant validity. All other assessments between any two constructs revealed that the average variance extracted for each construct was higher than the squared correlation matrix estimated between those constructs, supporting discriminant validity.

Moreover, the composite alpha coefficients for TML, EM, CF, SM, QD&R, and PM (which ranged from 0.91 to 0.96) are greater than their correlation coefficients (ranging from 0.50 to 0.74) and other correlations with any pair of the other constructs in the current study confirmed that discriminant validity is supported for all constructs as recommended by Gaski (1984) and Eisingerich and Bell (2007).

Table 4-22: Squared Correlation Estimates and AVE

constructs	AVE	(TML)	(EM)	(CF)	(SM)	(QD&R)	(PM)
TML	0.91	*1*					
EM	0.89	*0.46*	*1*				
CF	0.90	*0.46*	*0.38*	*1*			
SM	0.88	*0..29*	*0.27*	*0.25*	*1*		
QD&R	0.93	*0.38*	*0.36*	*0.37*	*0.42*	*1*	
PM	0.92	*0.46*	*0.39*	*0.37*	*0.57*	*0.47*	*1*

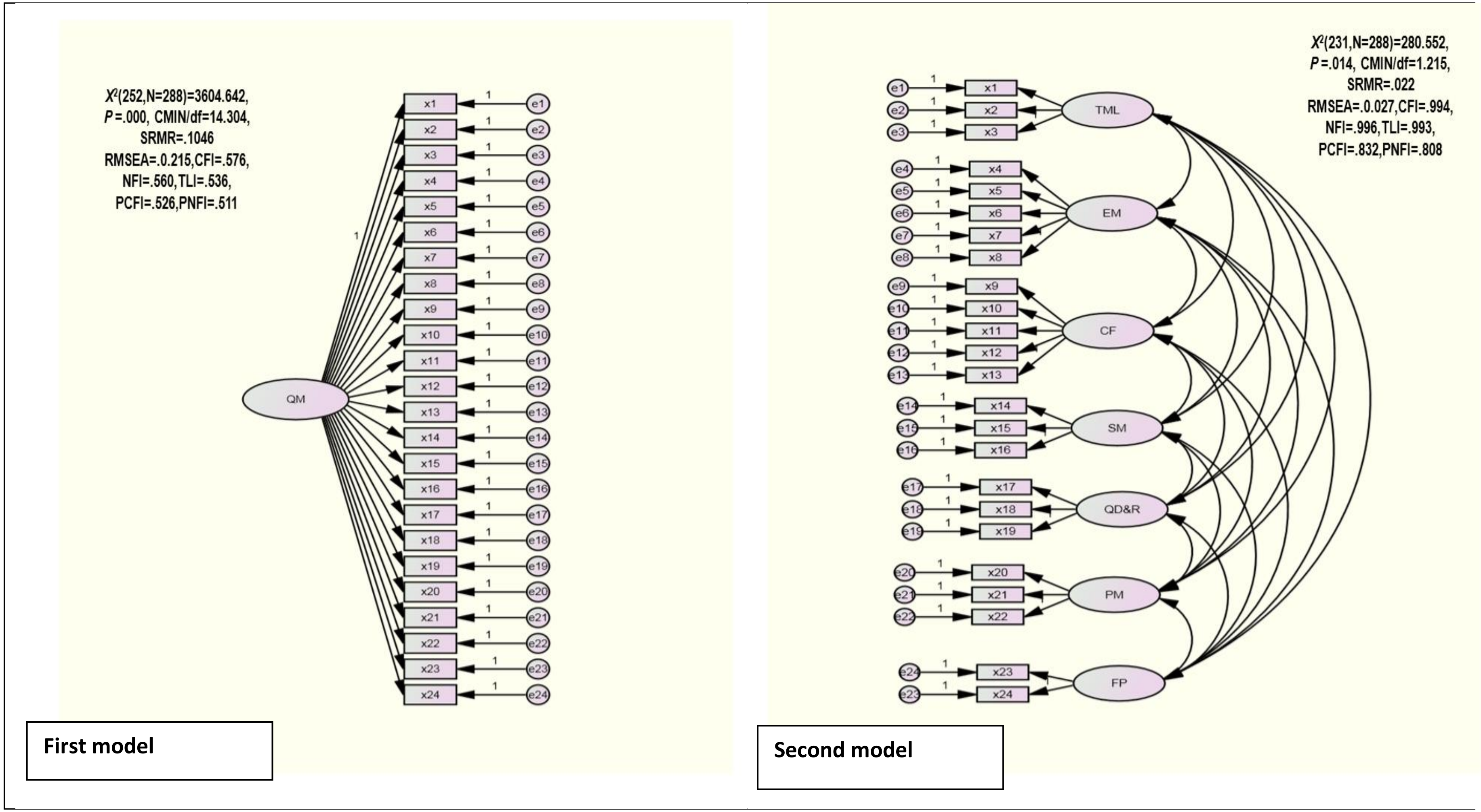
*** Numbers in italic are the squared correlation estimates between the constructs,**
***AVE = average variance extracted. For discriminant validity, AVE should be larger than the squared correlation estimates. * TML=total management leadership; EM =employee management; CF= customer focus; SM= supplier management; QD&R= quality data and reporting; PM= process management**

4.4.2.3 Assessing common method variance (bias)

Common method variance (CMV) refers to the amount of spurious covariance shared among the research variables because of the common method employed in collecting data (for more details see Section 3.5.2.1.2.1)

Besides the ex-ante procedures, described in section 3.5.2.1.2.1, some ex-post statistical remedies have been adopted in the current study to examine CMV. Harman's single factor method was employed to test CMV where all research variables (dependents and independents) are entered in SPSS for EFA and the number of factors extracted constrained to one with no rotation method. Accordingly, only one factor emerged to explain 41 percent of the variance, which indicates that it does not explains the majority of the variance, therefore CMV is not a major concern in the current study. The Harman's single factor results were supported by more sophisticated methods by conducting two CFA models. In the first model, all variables (dependents and independents) were allowed to measure only one factor, while in the second model, all the items (independent and dependent) were allowed to load on their theoretical constructs. The model fit indices in Figure 4.7, show that the second model fits the data better than the first model, which indicates that CMV is not responsible for the relationship among the research variables.

Figure 4-7: Common method variance two model comparison.



4.4.3 Structural Model (s) Analysis (analysis of causal relationships)

This analysis aims to investigate the causal relationship between quality management (QM) and competitive advantage (operationalized in the current study as above average financial performance where; financial performance was measured by two indicators: employees productivity and revenue per room, as explained in Section 3.1), in order to identify which quality management practices generate competitive advantage.

The relationship between QM and hotel financial performance (as a latent construct) as pictured in Figure 4.8, is briefly discussed below as it has received a lot of attention in the literature (Flynn et al., 1995; Easton and Jarell, 1998; Agus and Sagir, 2001; De Cerio, 2003; Kaynak, 2003; Kaynak and Hartley, 2005; Sila and Ebrahimpour, 2005; Barker and Emery, 2006; Feng et al., 2006; Lakhal et al., 2006; Prajogo and Sohal, 2006; Terziovski, 2006; and Su et al., 2008), followed by investigating the relationship between QM and CA.

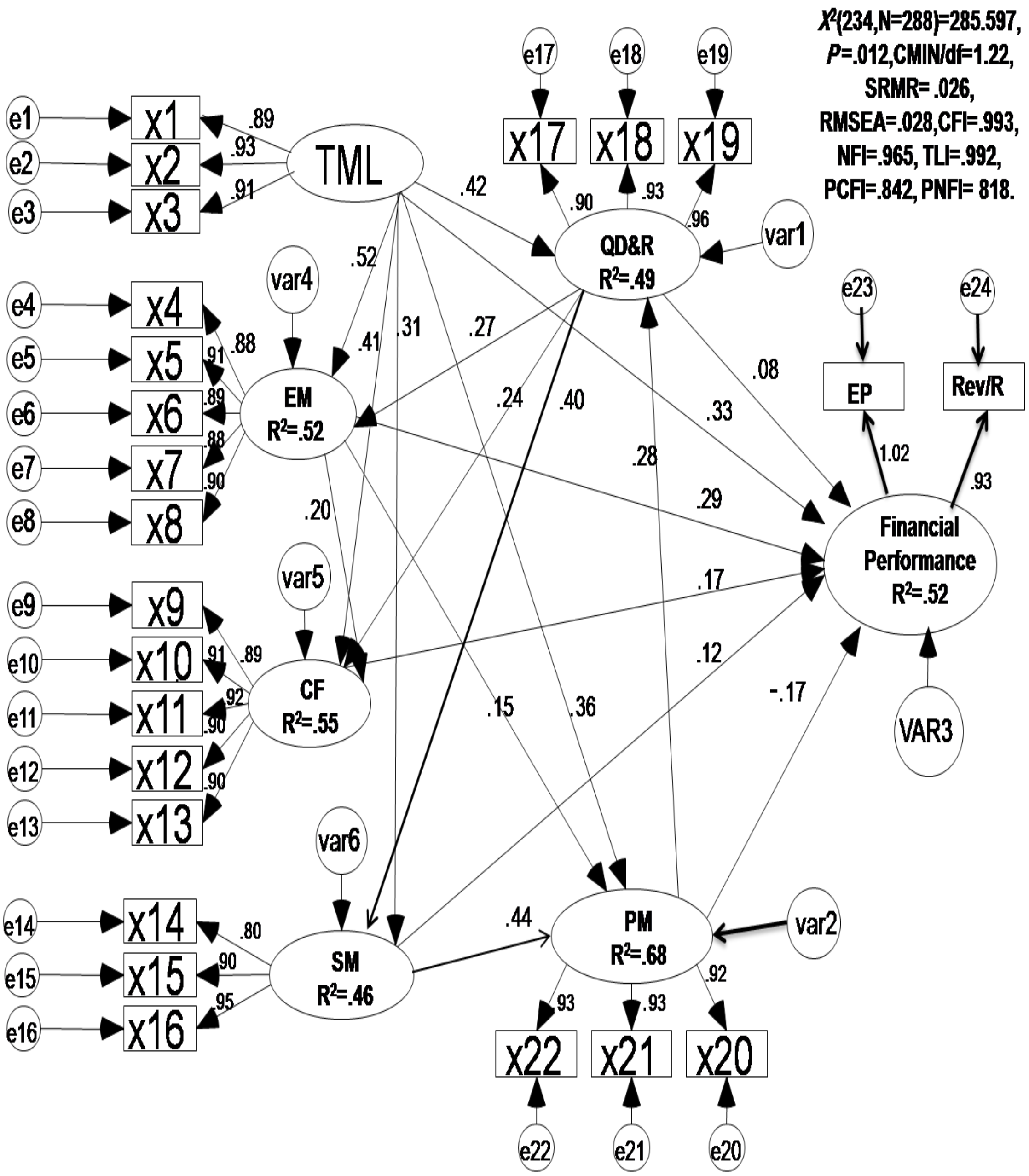
4.4.3.1 Quality management and financial performance model

All the assumptions that should be considered before testing the model with SEM (such as adequate sample size, dealing with missing data and outlier, normality, linearity, multicollinearity and singularity) were previously discussed (see SEM assumption Section 3.5.2.2.1) and examined (see preliminary analysis Section 4.2 and descriptive statistics Section 4.3). The main conclusion of the discussion and examination of the SEM assumptions is that the data of the current study is adequate to be analysed by using SEM.

All the direct and indirect relationships between quality management practices and financial performance (see research framework and hypotheses Section 2.3); are drawn and subjected to SEM as shown in Figure 4.8.

The results of testing this model are presented within the following sections: model specification, model identification, model estimation, model evaluation, hypotheses testing and model modification and validation as discussed in the Section 3.5.2.2.

Figure 4-8: The relationship between quality management and financial performance



TML: Top Management Leadership; EM: Employee Management; CF: Customers Focus; SM: Supplier Management; QD&R: Quality Data and Reporting; PM: Process Management; X1: X22 quality management indicators, FP: Financial Performance; EP, and REV/R: financial performance indicators; e1-e24: Measurement error associated with the observed variables. var1- var6: Residual error in the prediction of unobserved endogenous factors. The model also contains the paths coefficient between the factors and the factor loading from the factors to the observed variables.

A- Model Specification and Identification

The structural models consist of the regressions among the six quality management latent factors (i.e. top management leadership (TML), employee management (EM), customer focus (CF), supplier management (SM), quality data and reporting (QD&R), and process management (PM)), and the regressions between these six QM latent factors and financial performance (FP) (see research framework and hypotheses Section 2.3). These latent constructs were measured by using multi - item scales (see Section 3.1) which constitutes the measurement model section; each item has its related error term as shown in Figure 4.8.

In summary, there are 300 distinct sample moments, or, in other words, elements in the sample covariance matrix (i.e. number of pieces of information provided by the data). This can be calculated based on the formula p (p+1)/2 where p is the observed variables (Byrne, 2010). Therefore the data is 300 (24[24]+1)/2), and there are 66 (35 regression weights and 31 variance) parameters to be estimated (see model estimation below), thereby leaving 234 (300-66) degrees of freedom based on an over identified model.

B- Model Estimation

All factors that can affect model estimation and often result in error messages (i.e. missing data, outliers, multicollinearity, nonnormality of data distributions) are considered and examined as discussed in sections 4.2 and 4.3.

The data for the model was entered in AMOS v17 by using the ML estimation technique (as previously discussed in SEM Section 3.5.2.2) and AMOS Graphic was used to draw the measurement and structural paths collectively in the model as shown in figure 4.8. There are 72 *regression weights*, 37 of which are fixed (the first of each set of seven factor loadings and the 24 error term and the six factor variances) 35 of which are estimated (17 factor loadings and 18 path coefficients). There are 31 *variances,* all of which are estimated, as shown in Table 4.23.

Table 4-23: parameter summary of QM and FP model

	Weights	Covariance	Variances	Means	Intercepts	Total
Fixed	37	0	0	0	0	37
Labeled	0	0	0	0	0	0
Unlabeled	35	0	31	0	0	66
Total	72	0	31	0	0	103

As shown in Table 4.24, there is no standardized parameters estimation exceeds the value of 1.00 except one value related to the standardized parameters estimation for employee productivity (x23) exceeds the value of one (1.02). Additionally, no negative error variance is found except the one value related to error variance number 23 (e23). The reasons of these two illogical values are discussed in the following section concerning model evaluation.

C- Model Evaluation

The evaluation criteria focus on the adequacy of (a) the parameter estimates, and (b) the model as a whole.

First, regarding the adequacy of parameter estimates (see Table 4.24), all the critical ratio (C.R.) values (parameter estimate divided by its standard error) (except e23 value) are greater than 1.96, which indicates that all the estimates are statistically different from zero, and there is an evidence to reject the null hypothesis (that the estimate equals 0.0, in other words, no relationship exists).

There is not a single reason for negative error variances or standardized parameter estimations that exceeds **|1.0|**. Among these reasons are outliers (Bollen 1987), under identification (Van Driel, 1978; and Boomsma and Hoogland, 2001), misspecified models (Van Driel, 1978; Dillon et al., 1987; Sato, 1987, Bollen, 1989; Byrne, 2010) or sampling problems (Van Driel, 1978; Boomsma, 1983; and Anderson and Gerbing, 1984).

The structure and measurement model collectively fit the data well (discussed in detail later in the current section) so the misspecification reason is eliminated, the model is overidentified with 234 degrees of freedom as previously illustrated in the current model identification section and the sample size is adequate for SEM (see SEM assumption Section 3.5.2.2.1) as well, therefore the sampling variation and the underidentification causes as well are eliminated. The current study data related to the financial performance indicators has some outliers, as previously explained in the preliminary analysis section 4.2 and descriptive statistics section 4.3, and the decision was to keep them. Therefore the reason for these illogical values is the outliers of the indicator related to X23 (employee productivity); this value is non -significant (P=0.16) and does not cause any problem for model fit.

Table 4-24: Path coefficients, variances and R^2 of the Measurement Model (QM&FP)

	Regression Weight						Variance				
	Stand. Est.	Unstand Est.	S.E.	C.R.	P	R^2		Est.	S.E.	C.R.	P
X3 ◄--- TML	.91	.940	.040	23.6	***	.83	e1	.707	.078	9.053	***
X2 ◄---- TML	.93	.996	.038	26.3	***	.87	e2	.492	.067	7.325	***
X1 ◄---- TML	.89	1.000				.79	e3	.621	.075	8.255	***
X8 ◄------ EM	.90	.889	.040	22.1	***	.81	e4	.766	.077	9.973	***
X7 ◄------ EM	.88	.968	.040	23.9	***	.77	e5	.668	.073	9.205	***
X6 ◄------ EM	.89	.895	.039	22.8	***	.79	e6	.689	.071	9.654	***
X5 ◄------ EM	.91	.882	.040	22.1	***	.83	e7	.757	.076	9.983	***
X4 ◄------ EM	.88	1.000				.77	e8	.787	.083	9.514	***
X13◄---- CF	.90	.970	.042	22.9	***	.81	e9	.872	.087	9.981	***
X12 ◄---- CF	.90	.925	.038	24.0	***	.81	e10	.654	.069	9.485	***
X11 ◄---- CF	.92	.967	.039	24.7	***	.85	e11	.632	.069	9.172	***
X10 ◄---- CF	.91	.950	.040	23.6	***	.83	e12	.730	.076	9.662	***
X9 ◄---- CF	.89	1.000				.79	e13	.892	.083	10.76	***
X16 ◄---- SM	.95	.739	.038	19.2	***	.90	e14	.417	.054	7.711	***
X15 ◄---- SM	.90	.832	.032	26.0	***	.81	e15	.274	.062	4.426	***
X14 ◄--- SM	.80	1.000				.64	e16	.841	.088	9.593	***
X19 ◄-- QD&R	.96	.935	.033	28.6	***	.92	e17	.581	.072	8.084	***

X18 ←--- QD&R	**.93**	**.957**	**.030**	**32.2**	*******	**.87**	e18	**.376**	**.064**	**5.835**	*******
X17 ←-- QD&R	**.90**	**1.000**				**.81**	e19	**.710**	**.082**	**8.672**	*******
X22 ←--- PM	**.93**	**.992**	**.036**	**27.6**	*******	**.87**	e20	**.571**	**.073**	**7.800**	*******
X21 ←---- PM	**.93**	**.994**	**.034**	**28.9**	*******	**.87**	e21	**.599**	**.076**	**7.900**	*******
X20 ←--- PM	**.92**	**1.000**				**.85**	e22	**.892**	**.083**	**10.76**	*******
Y24 ←--- FP	**.93**	**1.179**	**.034**	**35.0**	*******	**.87**	e24	**.840**	**.130**	**6.461**	*******
Y23 ←--- FP	**1.02**	**1.000**				**1.04**	e23	**-1.60**	**.840**	**-1.909**	**.16**

*****Correlation is significant at the 0.00 level (2-tailed)**

Second: Model as a whole

The current study takes a confirmatory approach in which the researcher hypothesizes a specific theoretical model (from reviewing the literature), gathers data, and then tests whether the data fit the model (Schumacker and Lomax, 2010). In this approach, the theoretical model is either accepted or rejected based on a chi-square statistical test of significance and meeting acceptable model fit criteria (see Section 3.5.2.2)

In this Model (See Figure 4.13), $\chi 2$ is 285.597 with 213 degrees of freedom and probability level *<0.05*. This P value is significant (*<0.05)* which means that there is evidence that the null hypothesis (the model fits the data well) is rejected. In other words, this significant $\chi 2$ GOF statistic measures indicates that the observed covariance matrix (S) does not match the estimated covariance matrix (∑k).

However, because the chi-square value cannot be used alone, as it depends on sample size and will almost always be significant with large samples (Harrington, 2009), three alternative goodness –of- fit measures (absolute fit, incremental fit, and parsimony fit measures) are employed.

The fit indices of $\chi 2$/df, SRMR, and RMSEA, are employed as measures of absolute fit; CFI, NFI, and TLI are employed to assess incremental fit, while PCFI and PNFI are employed to measure the parsimony fit (see Section 3.5.2.2). Table 4.25 presents the information on selected fit indices from the output used in the evaluation of the structural model. In summary, the $\chi 2$/df is 1.22 and is in an acceptable range according to the criterion ≤ 3 (Kline, 1998) and ≤ 5 (Bentler, 1989; Shumacker and Lomax, 2004; Chiu et al., 2006).

Table 4-25: Summary of model fit indices for the proposed research model

Research model	Obtained fit indices							
	AFM			IFM			PFM	
	CMIN/df	RMSEA	SRMR	CFI	NFI	TLI	PNFI	PCFI
	1.22	**0.028**	**0.026**	**0.993**	**0.965**	**0.992**	**0.842**	**0.818**
Suggested fit indices								
	≤ 3	**≤ 0.05; ≤ 0.08**	**<0.05**	**≥0.90**	**≥0.90**	**≥0.90**	**> 0.5**	**> 0.5**

RMSEA (Root Mean Square Error of Approximation) value is 0.028. This value is below the established cut-off values of 0.1, as recommended by Bagozzi and Yi (1988), Henry and Stone (1994), Hair et al. (2006), and Byrne (2010), which means that the model, with unknown but optimal parameters values, fits well the population covariance matrix if it is available. Additionally, the value of SRMR (standardized root mean square residual), is 0.026 which means that the average residual value derived from the fitting of the variance-covariance matrix of the hypothesized model to the variance-covariance matrix of the observed sample data is below the established cut-off value of 0.08, as recommended by Hair *et al.* (2006), and Byrne (2010). Moreover, regarding the incremental fit measures, which assess how well the model fits relative to the null model (in which all correlations are equal to zero), CFI, NFI, and TLI are 0.993, 0.965, and 0.992 respectively, which exceed the cut-off value of 0.9, as recommended by Bentler (1990), Hair et al. (2006), Chow and Chan (2008) and Yang et al. (2008) which means that the hypothesized model fits the data better than the null model where all the correlations are equal to zero. Finally, PCFI and PNFI as measures for parsimony fit, which inform which model among a set of competing models is the best, are 0.842 and 0.818. These values are greater than the cut-off value of 0.5 as recommended by Hair et al. (2006) and Chow and Chan (2008). This means that the hypothesized model fits the data better than the null model (in which all correlations are equal to zero) and the saturated model (where the number of parameter estimates is equal to the number of data points). In conclusion, the goodness – of fit- measures indicates that the model fits the data and could be used to explain the study hypotheses.

A- Hypothesis Testing

After obtaining a satisfactory model fit, the researcher tests the research hypotheses (are previously explained in Section 2.3). Each path in the structural model between the latent variables represents a specific hypothesis. Hypotheses are usually tested in the form of a null hypothesis H0 where no relationship exists or estimate equals zero. The null hypotheses either not rejected or rejected depending on the significance level (P value) of the standardised coefficient of research parameters. If that P value is less than the significant level (i.e. $P \leq 0.1$) we have evidence to reject the null hypothesis, and if the P value is greater than the significant level (i.e. $P > 0.1$), we have no evidence to reject the null hypothesis (Pallant, 2007). The levels of significance that are employed in the current study are: ≤ 0.1, ≤ 0.05, ≤ 0.01 and ≤ 0.001. The lower the significance level, the more the data must deviate from the null hypothesis (estimate equals zero). Therefore, the 0.001 level is more conservative than the 0.01 level. In this study, a significance level less than 0.1 ($P \leq 0.1$) is considered a weak significance level (some studies employed this value as acceptable significant level such as those by Samson and Terziovski, 1999; Ahire and Dreyfus, 2000; Kaynak, 2003; Zu et al., 2008), ≤ 0.05 is considered acceptable significance level, while ≤ 0.01 is considered strong significance level, and ≤ 0.001 is considered a high significance level.

Hypothesis 2 was previously tested in CFA, which supports the view that QM is a multidimensional construct.

According to the proposed research model, there are eighteen hypotheses representing the proposed relationships among research variables (see Figure 4.8). Structural equation modelling using AMOS v17 is employed to test the null hypothesis (estimate equals zero) of these relationships (between the latent factors) as shown in Figure 4.8. Those relationships represent the likely direct and indirect relationships between quality management and financial performance. Table 4.26 presents selected output from AMOSv17 showing the hypotheses, standardized (estimates) regression weights, standard error, critical ratio, the P-value, and whether the null hypothesis is supported or rejected. This information is used in the interpretation of the paths between the variables as illustrated below:

The relationship between quality management practices and financial performance

It is hypothesized that the QMPs (top management leadership (TML), employee management (EM), customer focus (CF), supplier management (SM), quality data and reporting (QD&R), and process management (PM) are positively associated with the hotel financial performance as indicated in the H3, H4, H5, H6, H7, and H8 respectively:

Hypothesis 3: Top management leadership has a positive effect on firm financial performance.

Hypothesis 4: Employee management has a positive effect on firm financial performance.

Hypothesis 5: Customer focus has a positive effect on firm financial performance.

Hypothesis 6: Supplier management has a positive effect on firm financial performance.

Hypothesis 7: Quality data and reporting has a positive effect on firm financial performance.

Hypothesis 8: Process management has a positive effect on firm financial performance.

An examination of the path coefficients and the related P-value to assess the relationship among the QMPs and hotel financial performance reveals that only four out of six QM dimensions (TML, EM, CF, and SM) have a direct positive effect on the firm financial performance. The path coefficient between TML and financial performance is 0.33 with a high significance P-value ($P<0.001$). This highly significant ($P <0.001$) path coefficient provide an evidence to reject the null hypothesis (no relationship exists) and indicates that TML has a positive direct effect on financial performance. Additionally, the path coefficient between variable EM and financial performance is 0.29 with a high significance P-value ($P<0.001$). This highly significant ($P <0.001$) path coefficient provides an evidence to reject the null hypothesis (no relationship exists) and indicates that EM has a positive direct effect on financial performance. Moreover, the path coefficient between variable CF and financial performance was 0.17 with a strong significance P-value ($P<0.01$). This small but strongly significant ($P <0.01$) path coefficient gives an evidence to reject the null hypothesis (no relationship exists) and indicates that CF has a positive direct effect on financial performance. Furthermore there is a small positive and weak significant path coefficient between SM and financial performance (0.12, P=0.077). This weakly significant P value gives an evidence to reject the null hypothesis and indicates that there is positive but weak significant ($P < 0.1$) effect of SM on FP.

On the other hand, the path coefficient between the variable PM and financial performance is negative but significant (-0.17, P= 0.037). This negative (but significant) relationship is not in the expected positive direction, which indicates that the positive direct effect of PM on financial performance is not supported. Additionally, there is a small positive but insignificant path coefficient between QD&R and financial performance (0.08, P=0.235). This insignificant P value indicates that there is no evidence to support the positive effect of QD&R on FP.

Table 4-26: Hypothesised relationships, Standardised Regression Weights, P-values, and null hypotheses supported/rejected (QM&FP).

	Hypothesised Relationships	Standardised estimate	*S.E.*	*C.R. (T-value)*	*P*	Null hypothesis (estimate equals zero)	interpretation
H3	FP <---- TML	.33	.0735	4.488	***	Reject	TML has a positive direct effect on FP (effect size = .33)
H4	FP <---- EM	.29	.0630	4.597	***	Reject	EM has a positive direct effect on FP (effect size = .29)
H5	FP <---- CF	.17	.0638	2.664	**	Reject	CF has a positive direct effect on FP (effect size = .17)
H6	FP <---- SM	.12	.0679	1.767	$.077^{+}$	Fail to Reject	The positive effect of SM on FP is not supported at probability level (*P*) <.05 (i.e. t-value < .196) but can be supported at probability level (*P*) <.1
H7	FP <---- PM	-.17	.0815	-2.085	*	Fail to Reject	PM has a negative direct effect on FP(effect size equals -.17)
H8	FP <---- QD&R	.08	.0673	1.188	.235	Fail to Reject	The positive effect of SM on FP is not supported at probability level (*P*) <.05 (e.g. t-value < .196)
H3a	CF ←-- TML	.41	.0693	5.916	***	Reject	TML has a positive direct effect on CF (effect size = .41)
H3b	EM ←-- TML	.52	.0637	8.162	***	Reject	TML has a positive direct effect on EM (effect size = .52)
H3c	SM ←-- TML	.31	.0696	4.451	***	Reject	TML has a positive direct effect on SM (effect size = .31
H3d	QD&R ←-- TML	.42	.0769	5.461	***	Reject	TML has a positive direct effect on QD&R (effect size = .42)
H3e	PM ←-- TML	.36	.0625	5.756	***	Reject	TML has a positive direct effect on PM (effect size = .36)

H4a	CF <---- EM	.20	.0660	3.030	**	Reject	EM has a positive direct effect on CF (effect size = .20)
H4b	PM <---- EM	.15	.0602	2.490	*	Reject	EM has a positive direct effect on PM (effect size = .15)
H6a	PM <---- SM	.44	.0534	8.237	***	Reject	SM has a positive direct effect on PM (effect size = .44)
H7a	EM <---- QD&R	.27	.0625	4.318	***	Reject	QD&R has a positive direct effect on EM (effect size = .27)
H7b	CF <---- QD&R	.24	.0596	4.022	***	Reject	QD&R has a positive direct effect on CF (effect size = .24)
H7c	SM <---- QD&R	.40	.0762	5.246	***	Reject	QD&R has a positive direct effect on SM (effect size = .40)
H8a	QD&R <---- PM	.28	.0848	3.298	***	Reject	PM has a positive direct effect on QD&R (effect size = .28)

*****Correlation is significant at the 0.00 level; ** Correlation is significant at the 0.01 level; * Correlation is significant at the 0.05 level; + Correlation is significant at the 0. 1 level; TML: Top Management Leadership; EM: Employee Management; CF: Customers Focus; SM: Supplier Management; QD&R: Quality Data and Reporting; PM: Process Management; S.E.: standard error; C.R.: critical ratio.**

The previous results represent the standardised direct effects of QM on financial performance (FP), while as in Table 4.27 there are some inter-relationships between the QM dimensions as discuss in follows.

Inter-relationships among quality management practices:

The relationship between Top Management Leadership (TML) with EM, CF, SM, QD&R, and PM

It is hypothesized that top management leadership (TML) has a positive effect on employee management (EM), customer focus (CF), supplier management (SM), quality data and reporting (QD&R), and process management (PM) and indicated in the H3a, H3b, H3c, H3d, and H3e respectively:

> *Hypothesis 3b: Top management leadership has a positive effect on customer focus.*
>
> *Hypothesis 3b: Top management leadership has a positive effect on employee management.*
>
> *Hypothesis 3c: Top management leadership has a positive effect on supplier management.*
>
> *Hypothesis 3d: Top management leadership has a positive effect on quality data and reporting.*
>
> *Hypothesis 3e: Top management leadership has a positive effect on process management.*

All the direct effects of TML on EM, CF, SM, QD&R, and PM have positive path coefficients that are high significantly different from zero and are in the expected direction. Generally speaking, these significant P values give an evidence to reject the null hypotheses (estimates equal zero). More specifically, the path coefficients are respectively (0.41, P<0.001) for the effect of TML on EM, (0.52, P<0.001) for the effect of TML on CF, (0.31, P<0.001) for the effect of TML on SM, (0.42, P<0.001) for the impact of TML on QD&R, and (0.36, P<0.001) for the impact of TML on PM. This implies that there are positive direct effect of TML on EM, CF, SM, QD&R, and PM respectively (see Table 4.26).

The relationship between employee management (EM) with CF, and PM

It is hypothesized that employee management (EM) has a positive effect on customers focus (CF) and process management (PM) and proposed as H4a, and H4b, respectively as below:

> *Hypothesis 4a: Employee management has a positive effect on customer focus.*
>
> *Hypothesis 4b: Employee management has a positive effect on process management.*

In examining the impact of employee management on CF, and PM, there is evidence that both effects (EM on CF and PM) have small path coefficients but are positive with strong and acceptable significant P–values respectively. This significant P value rejects the null hypothesis (estimates equals zero). The path coefficients are (0.20, $P<0.01$) for the effect of EM on CF, and (0.15, $P<0.05$) for the effect of EM on PM. This implies that there are small positive direct effects of EM on CF, and PM respectively (see Table 4.26).

The relationship between supplier management (SM) and PM

It is hypothesized that supplier management (SM) has a positive impact on process management (PM) proposed as H6a, as below:

> *Hypothesis 6a: Supplier management has a positive effect on process management.*

Supplier management was found to have a positive direct effect on process management. The path coefficient between SM and PM is 0.44 which is highly significant $P<0.001$. This P value rejects the null hypothesis (estimate equals zero). This implies that SM has a positive direct effect on PM (see Table 4.26).

The relationship between quality data and reporting (QD&R) with EM, CF, and SM:

It is hypothesized that quality data and reporting (QD&R) has a positive effect on employee management (EM), customer focus (CF) and supplier management (SM) and proposed as H7a, H7b, and H7c respectively as below:

Hypothesis 7a: quality data and reporting has a positive effect on employee management.

Hypothesis 7b: Quality data and reporting have a positive effect on customer focus.

Hypothesis 7c: Quality data and reporting have a positive effect on supplier management.

Hypothesis 7d: Quality data and reporting have a positive effect on process management.

All the direct effects of QD&R on EM, CF, and SM have path coefficients that are positive and high significantly different from zero and are in the expected direction. This significant P values reject the null hypotheses (estimates equal zero). More specifically, the path coefficients are respectively (0.27, $P<0.001$) for the impact of QD&R on EM, (0.24, $P<0.001$) for the impact of QD&R on CF, (0.40, $P<0.001$) for the impact of QD&R on SM. This implies that there are positive direct effects of QD&R on EM, CF, and SM respectively (see Table 4.26).

The relationship between process management (PM) and quality data and reporting (QD&R)

It is hypothesized that process management (PM) has a positive effect on quality data and reporting (QD&R) and proposed as H8a, as below:

Hypothesis 8a: Process management has a positive effect on quality data and reporting.

Process management have a positive direct effect on quality data and reporting (QD&R). The path coefficient between PM and QD&R is 0.28 which is highly significant $P<0.001$. This significant P value rejects the null hypothesis (estimate equals zero). This implies that there is a positive direct effect of PM on quality data and reporting (QD&R) (see Table 4.26).

Besides the previous direct effects, there are indirect effects of QM on financial performance as shown in table 4.27. More specific, there are indirect effects of top management leadership on financial performance through EM, CF, SM, QD&R, and PM as pictured in figure 4.8. Table 4.27 illustrates both the direct and indirect effects among those variables. According to Table 4.27, TML has an indirect effect on financial performance through EM, CF, SM, QD&R, and PM. According to this result, this indirect effect increases the standardised coefficient between the two variables from 0.33 to 0.65 (approximately double). Additionally, there are indirect effects of employee management on financial performance through CF and PM. According to Table 4.27, EM has a very small positive indirect effect on financial performance through CF and PM. According to this result, this indirect effect increases the standardised coefficient between the two variables from 0.29 to 0.31.

Moreover, there are indirect effects of supplier management on financial performance through process management (PM) (see Figure 4.8). According to Table 4.27 supplier management has a very small negative indirect effect on financial performance through process management (PM). According to this result, this indirect effect decreases the standardised coefficient between the two variables from 0.12 to 0.08.

Furthermore, there are indirect effects of quality data and reporting (QD&R) on financial performance through employee management (EM), customers focus (CF) and supplier management (SM) (see Figure 4.8). According to Table 4.27, QD&R has a very small positive indirect effect on financial performance through EM, CF and SM. According to this result, this indirect effect increases the standardised coefficient between the two variables from 0.08 to 0.1.

In the same way, there are indirect effects of PM on financial performance through QD&R (see figure 4.8) According to Table 4.26, PM has a very small positive indirect effect on financial performance through QD&R. According to this result, this indirect effect decreases the standardised negative coefficient between the two variables from - 0.17 to - 0.1.

Finally, the assessment of the predictive power of the SEM (see Figure 4.8) reveals that R^2 for the endogenous variables are as follows: employee management (0.52), customer focus (0.55), supplier management (0.46), process management (0.68) quality data and reporting (0.49), and financial performance (0.52), which indicated good predictive power, taking into consideration the substantial unexplained variance in the financial performance construct, which would probably be explained by a myriad of other factors including technology, scale, business structure and focus, and luck (Samson and Terziovski, 1999).

Table 4-27: $R^{2,}$ direct, indirect and total effects among research variables (QM&FP)

Criterion variable	Predictor variables	Direct effect	Indirect effect	Total effect
Financial performance (R^2 = .52)	**Top management leadership**	**.33**	**.32**	**.65**
	Employee management	**.29**	**.02**	**.31**
	Customer focus	**.17**	**.00**	**.17**
	Supplier management	**.12**	**-.04**	**.08**
	Process management	**-.17**	**.07**	**-.1**
	Quality data and reporting	**.08**	**.016**	**.1**

B- Model modification and validation

As previously discussed in the model evaluation Section 4.3.2.1.3, the model fits the data well so there is no need to perform any *specification search* to obtain a better fit (Kline, (2011). Two further techniques are used in the current study for model validation. While the first technique, uses some indexes such as expected cross-validation index (ECVI), Bayesian information criterion (BIC), and Akaike information criterion (AIC) to compare alternative models using only one single sample of data, the second technique bootstraps the original data to reproduce multiple subsamples and create bootstrap estimates and standard errors. The bootstrap estimator and related confidence interval are employed to decide how stable the sample statistic is as an estimate of the whole population (Byrne, 2010). See model modification and validation Section 3.5.2.2.6.

As shown in Table 4.28 the hypothesized model has the smallest values of ECVI, BIC, and AIC which indicates that it is the most stable in the population (Schumacher and Lomax, 2010).

Table 4-28: Amos output comparing different models values of EVCI, BIC, and AIC (QM&FP)

Models	ECVI	BIC	AIC
Default (hypothesized) model	**1.455**	**659.353**	**417.597**
Saturated model (just identified model)	**2.091**	**1658.888**	**600.000**
Independence model (null model, all correlations equal zero)	**28.680**	**8319.180**	**8231.269**

Bootstrap ML (maximum likelihood) is performed in a number of 1000 bootstrap samples with 95 percentile confidence interval. Selected AMOS output of the bootstrap estimates, standard error, mean bias, and confidence interval (P) is presented in Table 4.29.

Table 4-29: Amos output: Bootstrap estimates, standard error, bias and *confidence intervals (p) (QM&FP)*

	Estimates	**S.E.**	**Bias**	***P***
X3 ◄--- TML	**.913**	**.013**	**.000**	**.002**
X2 ◄---- TML	**.929**	**.012**	**.000**	**.002**
X1 ◄---- TML	**.892**	**.015**	**.001**	**.002**
X8 ◄------ EM	**.897**	**.013**	**.000**	**.002**
X7 ◄------ EM	**.877**	**.016**	**.000**	**.002**
X6 ◄------ EM	**.889**	**.014**	**.000**	**.002**
X5 ◄------ EM	**.905**	**.013**	**.000**	**.002**
X4 ◄------ EM	**.877**	**.016**	**.000**	**.002**
X13◄---- CF	**.896**	**.013**	**-.001**	**.002**
X12 ◄---- CF	**.901**	**.013**	**.000**	**.002**
X11 ◄---- CF	**.910**	**.012**	**.000**	**.002**
X10 ◄---- CF	**.906**	**.012**	**.000**	**.002**
X9 ◄---- CF	**.889**	**.014**	**.000**	**.002**

X16 <---- SM	.954	.011	.000	.002
X15 <---- SM	.907	.014	.000	.002
X14 <--- SM	.794	.023	.001	.002
X19 <-- QD&R	.958	.008	.000	.002
X18 <--- QD&R	.933	.010	-.001	.002
X17 <-- QD&R	.903	.013	.000	.002
X22 <--- PM	.931	.011	.000	.002
X21 <---- PM	.933	.010	.000	.002
X20 <--- PM	.919	.012	-.001	.002
Y24 <--- FP	.933	.013	.000	.002
Y23 <--- FP	1.020	.012	.001	.002
FP <---- TML	.328	.074	.004	.002
FP <---- EM	.294	.065	-.002	.002
FP <---- CF	.172	.066	-.002	.020
FP <---- SM	.120	.073	.003	.128
FP <---- PM	-.166	.086	-.001	.112
FP <---- QD&R	.082	.074	-.005	.359
CF ←-- TML	.405	.065	-.002	.002
EM ←-- TML	.516	.065	-.001	.002
SM ←-- TML	.307	.069	-.003	.002
QD&R ←-- TML	.423	.077	.003	.002
PM ←-- TML	.355	.061	-.001	.002
CF <---- EM	.200	.068	-.002	.014
PM <---- EM	.147	.062	.001	.022
PM <---- SM	.435	.050	.000	.002
EM <---- QD&R	.267	.061	.001	.002
CF <---- QD&R	.242	.057	.003	.002
SM <---- QD&R	.396	.077	.003	.002
QD&R <---- PM	.284	.084	-.004	.007

The original data parameter estimates, standard error, and P values presented in Tables 4.24, 4.26 and the bootstrap estimates and standard error presented in Table 4.29 are very similar, that is, the differences are very small. Additionally, the information provided in the *Bias* column in Table 4.29 represents the difference between the bootstrap mean estimate and the original sample estimate which is very small. Therefore, the results can be interpreted as being stable estimates of the whole population. However, the bootstrap technique is not without limitations. For example the bootstrap sampling distribution is created from on original sample which is assumed to represent the population. If that representation is not true, the bootstrap technique will cause misleading results (Zhu, 1997).

4.4.3.2 Quality management and competitive advantage SEM models

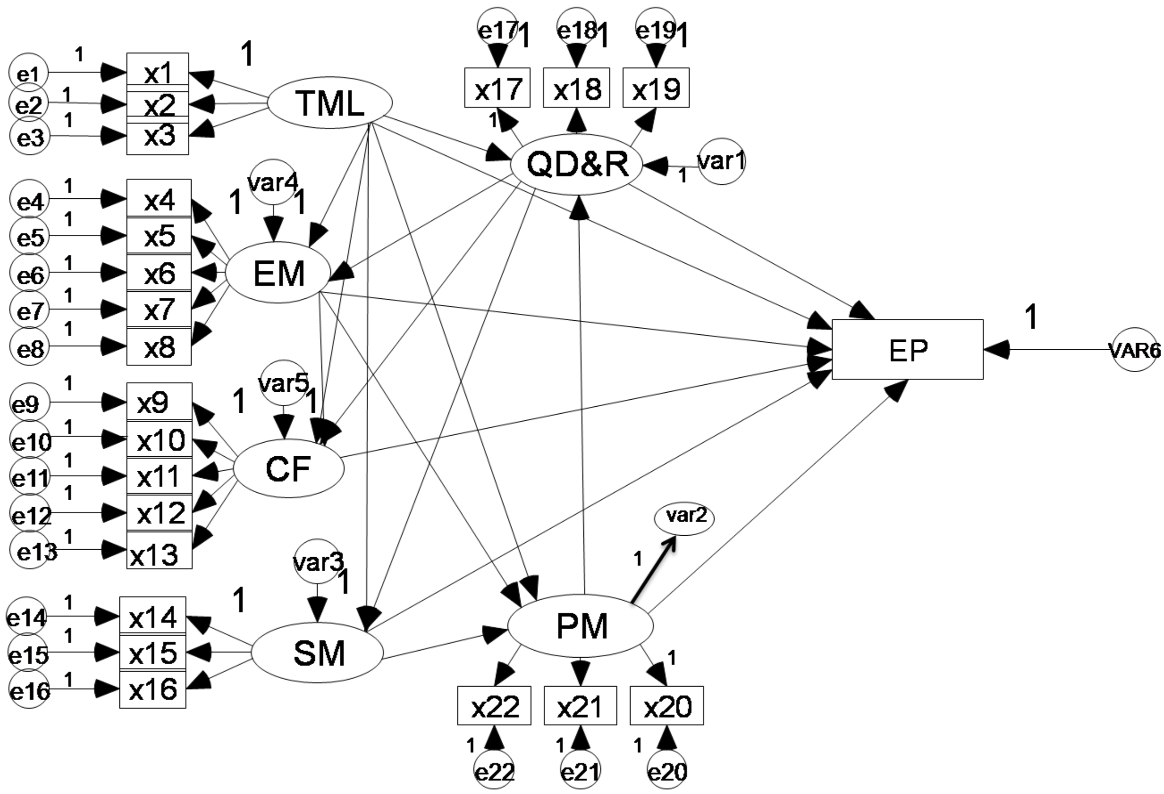
The previously explained model in Figure 4.8 tested the relationship between QM and FP. However, the aim of the current study is to identify which quality management practices give the hotel a competitive advantage (measured as above average financial performance) over its rivals. Therefore, because financial performance as a latent construct (measured by two indicators) cannot be split to identify above average financial performance (competitive advantage) and under average financial performance, two models are proposed**. The first model** tests the relationship between QM and employee productivity (as an indicator of financial performance) and the **second model** tests the relationship between QM and revenue per room (as an indicator of financial performance).

Each model is tested in SEM by using multi-group analysis procedure in which the data are split into two groups for those hotels that have above average employee productivity / revenue per room (competitive advantage) and those hotels that have under average employee productivity / revenue per room. The two groups (above, and under average performance) are compared to each other to find out the differences in the causal structure (paths from QMPs to the financial performance indicators (employee productivity / revenue per room)), and so to identify which QMPs give the hotel a competitive advantage over its rivals. The results of each model are presented below.

4.4.3.2.1 The relationship between QMPs and employee productivity model

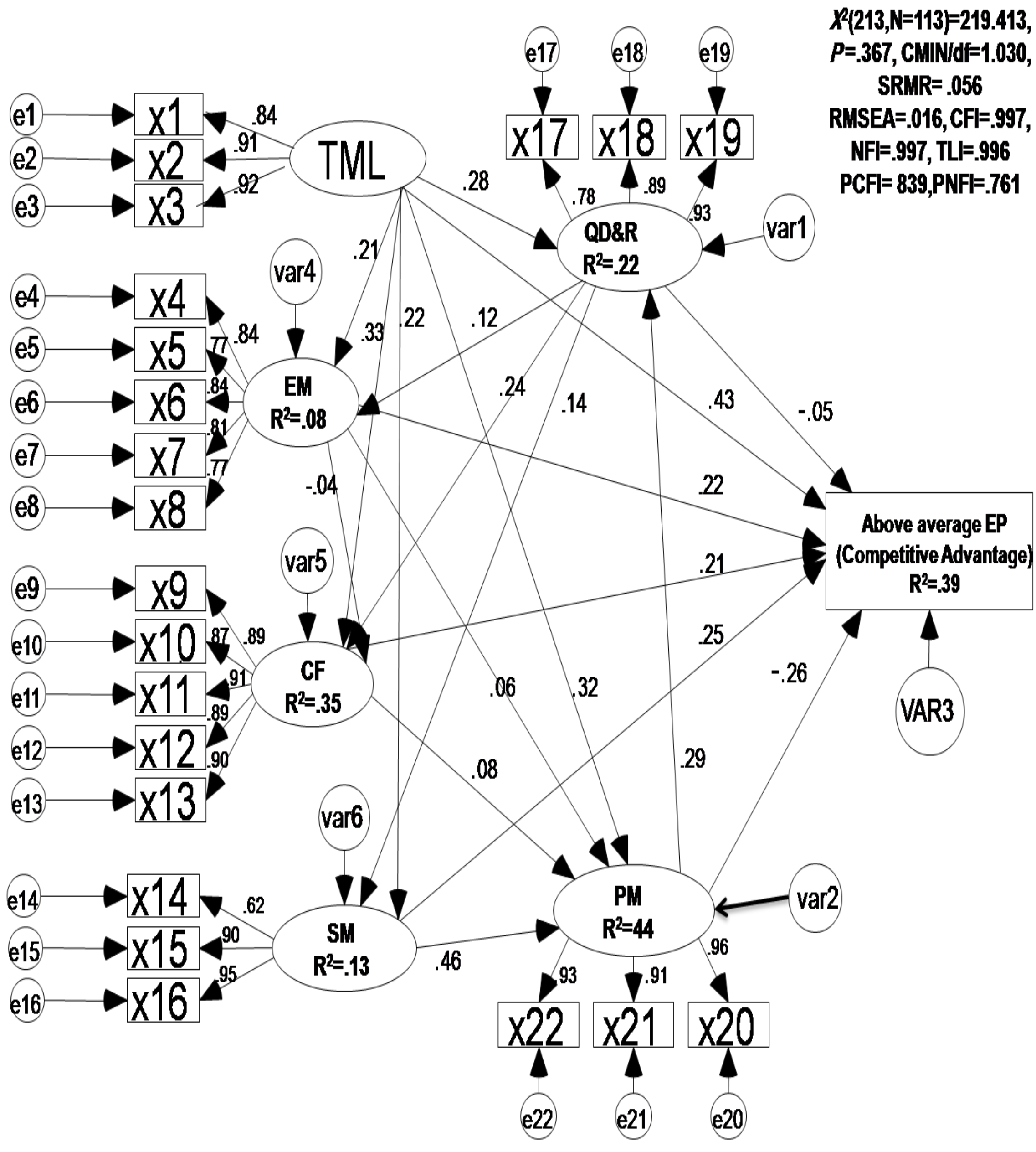
Following the procedures described in Byrne (2010) the model in Figure 4.9, which shows the relationships between QMPs and employee productivity, is analysed in SEM separately for each group of the current data (above average employee productivity (competitive advantage) and under average employee productivity) to calculate the goodness of fit for each model as shown in Figures 4.10 and 4.11. Then the same model as pictured in Figure 4.9 is tested in SEM for multi-group analysis simultaneously to find out whether or not the structural model (paths of the causal structure) is equivalent (i.e. invariant) across the previously mentioned two groups of interest .

Figure 4-9: The relationship between QMPs and employee productivity Model.



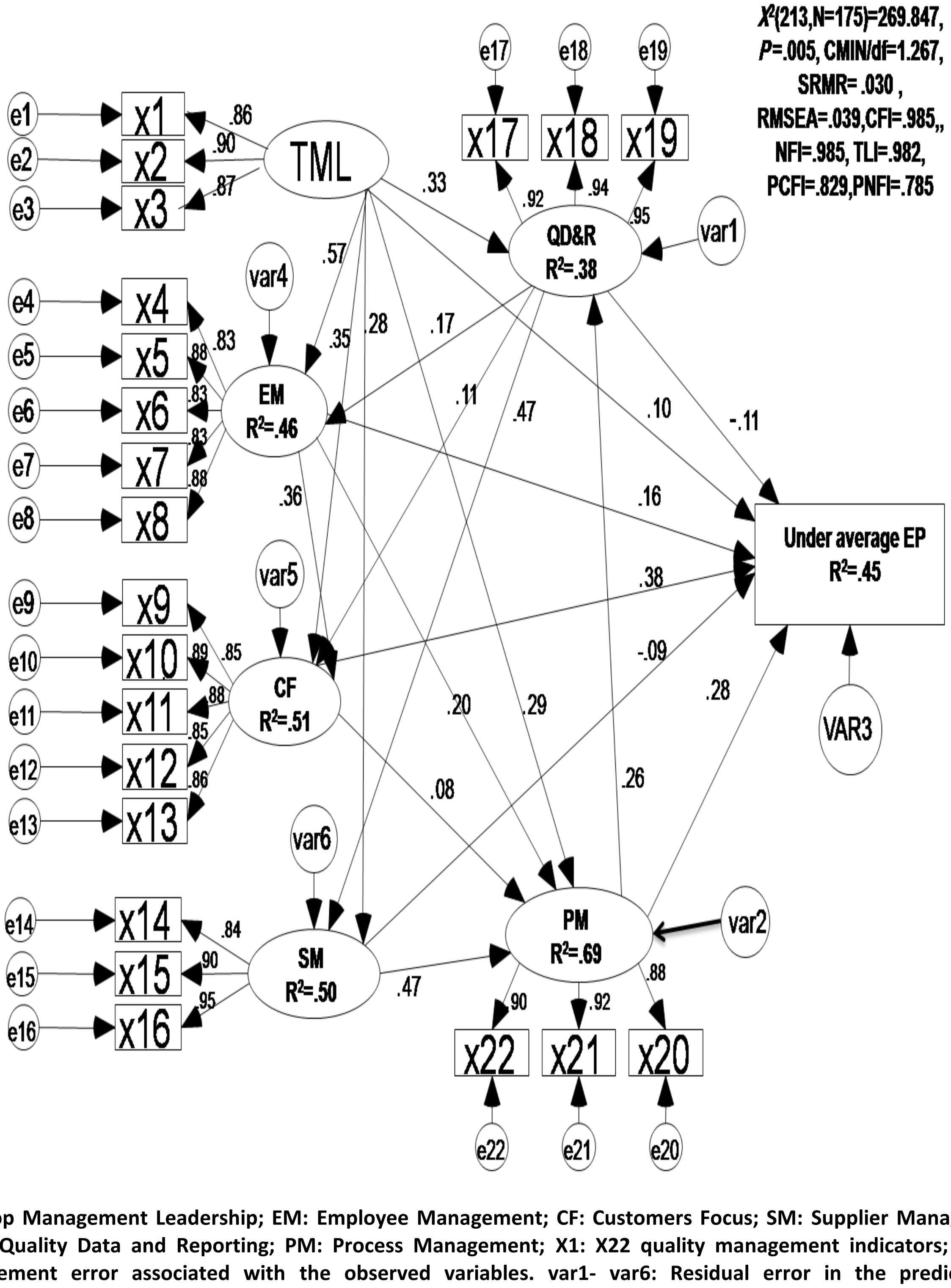
TML: Top Management Leadership; EM: Employee Management; CF: Customers Focus; SM: Supplier Management; QD&R: Quality Data and Reporting; PM: Process Management; EP: Employee productivity; X1: X22 quality management indicators; e1-e24: Measurement error associated with the observed variables. var1- var6 : Residual error in the prediction of an unobserved endogenous factors.

Figure 4-10: QMPs and above average employee productivity (competitive advantage) model



TML: Top Management Leadership; EM: Employee Management; CF: Customers Focus; SM: Supplier Management; QD&R: Quality Data and Reporting; PM: Process Management; X1: X22 quality management indicators. e1-e24: Measurement error associated with the observed variables. Var1- var6: Residual error in the prediction of unobserved endogenous factors. The model also contains the paths coefficient between the factors and the factor loading from the factors to the observed variables

Figure 4-11: QMPs and above under employee productivity model.



TML: Top Management Leadership; EM: Employee Management; CF: Customers Focus; SM: Supplier Management; QD&R: Quality Data and Reporting; PM: Process Management; X1: X22 quality management indicators; e1-e24: Measurement error associated with the observed variables. var1- var6: Residual error in the prediction of unobserved endogenous factors. The model also contains the paths coefficient between the factors and the factor loading from the factors to the observed variables.

All the assumptions that should be considered before testing the model with SEM (i.e. adequate sample size, dealing with missing data and outlier, normality, linearity, multicollinearity and singularity) are met as indicated in sections 3.5.2.2.1, Sections 4.2 and 4.3. All the direct and indirect relationships between quality management practices and employee productivity as indicators of financial performance (see research framework and hypotheses section 2.3), are drawn and subjected to SEM as shown in Figure 4.9.

The results of the above two models (Figure 4.10 and 4.11) are presented simultaneously in the following main sections: (a) Model specification and identification, (b) Model estimation, (c) Model Evaluation, (d) Multi-group analysis, (e) Hypotheses testing, and (f) Model modification and validation.

A- Model specification and Identification

The structure models (in Figures 4.10 and 4.11) consist of the regressions among the six quality management latent constructs: top management leadership (TML), employee management (EM), customer focus (CF), supplier management (SM), quality data and reporting (QD&R), and process management (PM), and the regressions between these six QM latent constructs and above average employee productivity (Figure 4.10) and under average employee productivity (Figure 4.11). These latent constructs are measured by using multi-item scales which constitute the measurement model section. Each item has its related error term as shown in Figures 4.10 and 4.11.

In summary, results related to the model in Figure 4.10, which tests the relationships between QMPs and above average employee productivity (competitive advantage), indicates that there are 276 distinct sample moments, or, in other words, elements in the sample covariance matrix (i.e. number of pieces of information provided by the data). This can be calculated based on the formula p(p+1)/2 where p is the observed variables (Byrne, 2010). Therefore the data is 276 (23[23]+1)/2), and there are 63 (34 regression weights and 29 variances) parameters to be estimated, thereby leaving 213 degrees of freedom based on an over identified model.

Turning to the model in Figure 4.11, there are 267 distinct sample moments, or, in other words, elements in the sample covariance matrix (i.e. number of pieces of information provided by the data).This can be calculated based on the formula p(p+1)/2 where p is the observed variables , therefore the data is 267 (23[23]+1)/2), and there are 63 (34 regression weights and 29 variance) parameters to be estimated, thereby leaving 213 degrees of freedom based on an over identified model.

Table 4-30: Parameter summary of model in Figures 4.10 and 4.11

	QMPs and above average EP (competitive advantage) model						QMPs and under average EP model					
	Weights	Covariance	Variances	Means	Intercepts	Total	Weights	Covariance	Variances	Means	Intercepts	Total
Fixed	34	0	0	0	0	34	34	0	0	0	0	34
Labelled	0	0	0	0	0	0	0	0	0	0	0	0
Unlabelled	34	0	29	0	0	63	34	0	29	0	0	63
Total	68	0	29	0	0	97	68	0	29	0	0	97

B- Model estimation

All factors that can affect model estimation and often result in error messages, (i.e. missing data, outliers, multicollinearity, nonnormality of data distributions are considered and examined as discussed in Sections 4.2 and 4.3 .

The data for the models are entered in AMOS v17 by using the ML estimation technique (see Section 3.5.2.2) and AMOS Graphic is used to draw the measurement and structural paths collectively in the model as shown in Figures 4.10 and 4.11.

In both, the model in Figure 4.10, and the model in Figure 4.11, variables and parameters **are equivalent, as in each single model,** there are 68 *regression weights*, 34 of which are fixed (the first of each set of six factor loadings and the 22 error terms and the five factor variances and one indicator variance) 34 of which are estimated (16 factor loadings and 18 path coefficients). There are 29 *variances,* all of which are estimated, as shown in Table 4.30.

As shown in Table 4.32, there is no standardized parameter estimation that exceeds the value of one and no negative error variance was found as well.

C- Model evaluation

The evaluation criteria focus on the adequacy of (a) the parameter estimates, and (b) the model as a whole.

First, regarding the adequacy of parameter estimates (see Table 4.32), all the critical ratio (C.R.) values (parameter estimate divided by its standard error) of both models of interest are greater than 1.96, which indicates that all the estimates are statistically different from zero, and there is evidence to reject the null hypothesis (estimate equals 0.0, in other words, no relationship exists). Additionally, all the parameter estimates for both models are positive and within the logical anticipated range of values (i.e. no negative values were obtained and no correlations exceed the value of 1.00) (see Table 4.32).

Second, regarding the model as a whole, the current study takes a confirmatory approach in which the researcher hypothesizes a specific theoretical model (from the review of the literature), gathers data, and then tests whether the data fit the model. In this approach, the theoretical model is either accepted or rejected based on a chi-square statistical test of significance and meeting acceptable model fit criteria (see Section 3.5.2.2). The $\chi 2$ GOF statistics provide an evidence that while the null hypothesis (model fits the data well) cannot be rejected in the model in **Figure 4.10 (QMPs and above average employee productivity**, it can be rejected in the other model in Figure 4.11 (**QMPs and under average employee productivity)**. However, because the chi-square value depends on sample size and will almost always be significant with large samples (Harrington, 2009), other fit measures are also considered, as below:

The other goodness of fit measures related to both models (Figures 4.10 and 4.11); indicate that both fit the data well. For the model in Figure 4.10 (QMPs with above average employee productivity–competitive advantage-) $\chi 2$ (213, N= 113) = 219.413, $P=0.367$ (Normed $\chi 2$ = *1.03, RMSEA=0.016, SRMR=0.056, CFI= 0.997, NFI=0.997, TLI=0.997, PCFI=0.839 , and PNFI=0.761).*For the model in figure 4.11 (QMPs with under average employee productivity) $\chi 2$ (213, N= 175) = 269.847, P*<0.01* (Normed $\chi 2$*= 1.267, RMSEA= 0.039, SRMR=0.03, CFI= 0.985, NFI=0.985, TLI=0.982,* *PCFI=0.829 , and PNFI=0.785).* However, the model in Figure 4.10 fits the data better than the model in Figure 4.11. Table 4.31 shows the goodness of fit measures for both models.

Table 4-31: Summary of model fit indices for the proposed two models in Figures 4.10 and 4.11.

Obtained fit indices															
GOF measures for QMPs and above average EP (competitive advantage) model								**GOF measures QMPs and under average EP model**							
AFM			**IFM**			**PFM**		**AFM**			**IFM**			**PFM**	
***χ2*/df**	**RMSEA**	**SRMR**	**CFI**	**NFI**	**TLI**	**PNFI**	**PCFI**	***χ2*/df**	**RMSEA**	**SRMR**	**CFI**	**NFI**	**TLI**	**PNFI**	**PCFI**
1.03	**.016**	**.056**	**.997**	**.997**	**.997**	**.839**	**.761**	**11.267**	**.039**	**.03**	**.985**	**.985**	**.982**	**.785**	**.829**
Suggested fit indices															
≤5	**≤0.05;≤.08**	**≤.05**	**≥0.90**	**≥0.90**	**≥0.90**	**≥0.5**	**≥0.5**	**≤ 5**	**≤0.05- ≤.08**	**≤.08**	**≥0.90**	**≥0.90**	**≥0.90**	**≥0.5**	**≥0.5**

Table 4-32: The path coefficients, variances and R^2 of both the measurement Models (QM& above-under EP).

QMPs and above average employee productivity (competitive advantage)												QMPs and under average employee productivity										
	Regression Weight						Variance					Regression Weight						Variance				
	Stand. Est.	Unsta. Est.	S.E.	C.R.	P	R^2		Est.	S.E.	C.R.	P	Stand. Est.	Unsta. Est.	S.E.	C.R.	P	R^2		Est.	S.E.	C.R.	P
X3 ◄--- TML	.92	.904	.070	12.8	***	.84	e1	.772	.127	6.062	***	.87	.925	.064	14.4	***	.75	e1	.677	.099	6.857	***
X2 ◄---- TML	.91	.994	.065	15.1	***	.83	e2	.455	.103	4.436	***	.90	.991	.063	15.7	***	.81	e2	.512	.091	5.655	***
X1 ◄---- TML	.84	1.000			***	.71	e3	.412	.100	4.103	***	.86	1.000				.74	e3	.734	.110	6.659	***
X8 ◄------ EM	.77	1.098	.119	9.20	***	.59	e4	.454	.082	5.504	***	.88	.859	.060	14.3	***	.77	e4	.947	.120	7.864	***
X7 ◄------ EM	.81	.970	.114	8.48	***	.66	e5	.595	.095	6.263	***	.83	.929	.058	15.9	***	.69	e5	.723	.102	7.052	***
X6 ◄------ EM	.84	1.127	.123	9.19	***	.71	e6	.487	.088	5.503	***	.83	.784	.054	14.3	***	.69	e6	.794	.101	7.855	***
X5 ◄------ EM	.77	.965	.109	8.86	***	.59	e7	.467	.078	5.997	***	.88	.846	.059	14.2	***	.77	e7	.929	.118	7.873	***
X4 ◄------ EM	.84	1.000				.71	e8	.649	.103	6.324	***	.83	1.000				.69	e8	.852	.120	7.103	***
X13◄---- CF	.90	1.003	.071	14.1	***	.80	e9	1.80	.312	5.765	***	.86	.947	.064	14.8	***	.74	e9	.937	.120	7.809	***
X12 ◄---- CF	.89	.933	.069	13.5	***	.79	e10	.762	.126	6.051	***	.85	.884	.055	16.0	***	.72	e10	.580	.082	7.087	***
X11 ◄---- CF	.91	.993	.066	14.9	***	.83	e11	.778	.124	6.286	***	.88	.923	.058	15.8	***	.77	e11	.675	.093	7.220	***
X10 ◄---- CF	.87	.995	.070	14.2	***	.76	e12	.573	.102	5.634	***	.89	.823	.056	14.7	***	.79	e12	.692	.089	7.756	***
X9 ◄---- CF	.89	1.000				.79	e13	.728	.121	6.021	***	.85	1.000				.72	e13	.942	.124	7.628	***
X16 ◄---- SM	.95	.570	.075	7.60	***	.90	e14	1.29	.182	7.129	***	.95	.819	.048	17.1	***	.90	e14	.590	.075	7.859	***
X15 ◄---- SM	.90	.839	.071	11.8	***	.81	e15	.472	.131	3.606	***	.90	.825	.043	19.1	***	.81	e15	.380	.058	6.511	***
X14 ◄--- SM	.62	1.000				.39	e16	.287	.162	1.775	***	.84	1.000				.71	e16	.245	.062	3.921	***
X19 ◄-- QD&R	.93	.871	.081	10.7	***	.87	e17	1.18	.186	6.369	***	.95	.974	.043	22.6	***	.90	e17	.598	.087	6.857	***
X18 ◄---QD&R	.89	.850	.072	11.8	***	.79	e18	.705	.134	5.273	***	.94	.984	.040	24.3	***	.88	e18	.451	.076	5.898	***
X17 ◄-- QD&R	.78	1.000				.61	e19	.376	.136	2.756	***	.92	1.000				.84	e19	.403	.074	5.436	***
X22 ◄--- PM	.93	1.113	.055	20.2	***	.87	e20	.273	.080	3.408	***	.90	.991	.059	16.8	***	.81	e20	.892	.127	7.042	***
X21 ◄---- PM	.91	1.025	.060	17.0	***	.83	e21	.573	.098	5.824	***	.92	1.000	.053	18.7	***	.84	e21	.585	.100	5.881	***
X20 ◄--- PM	.96	1.000				.93	e22	.428	.082	5.188	***	.88	1.000				.77	e22	.737	.112	6.589	***
							Var6	2.2	.3	7.33	***							Var6	2.4	.26	9.223	***

D- Multi-group analysis

The automated multi-group approach is tested in SEM, to find out whether or not the structural model (paths of the causal structure) are equivalent (i.e. invariant) across the previously mentioned two groups of interest (above and under average employee productivity) (see Section 3.5.2.2). The same number of factors and the factor-loading pattern are the same across groups, as such; no equality constraints are forced on any of the parameters (Byrne, 2010). Thus, the same parameters that were estimated in the baseline model for each group separately (as previously discussed in the models in Figures 4.10 and 4.11) are once more estimated in this multi-group model. In essence, then, the model can be considered as being tested here as a multi-group representation of the baseline models. Accordingly, it incorporates the baseline models for above and under average employee productivity within the same file. This model is commonly termed as the *configural model* (Byrne 2010; and Hair et al., 2006). Goodness of model fit values of this configural/baseline model (no equality constrains imposed) provide the baseline value which is compared against four subsequently specified constrained models (structural weights, measurement weights, measurement residuals, and structural residuals) (Byrne, 2010) (see Table 4.33).

Evidence of invariance can be based on CFI difference (ΔCFI) values versus the more traditional $\chi 2$ difference ($\Delta\ \chi 2$) values, as previously explained in section 3.5.2.2. (multi-group analysis). Because the central concern is whether or not components of the structural model are equivalent (i.e. invariant) across the two groups of interest, the CFI and $\chi 2$ values of the unconstrained/baseline model are compared to the same values in the structural weights model (structural paths coefficients are constrained equal across groups) to find out if the differences between the two models are significant and consequently which structural path coefficients are not operating equivalently across the two groups. In other words, it gives the answer to which QMPs can generate competitive advantage. Table 4.33 shows the results of the previously mentioned five models.

Table 4-33: Goodness-of fit measures for the five models

Model	CMIN	DF	P	CMIN/DF	SRMR	RMSEA	NFI	TLI	CFI
Unconstrained (configural model)	**489.3**	**426**	.018	1.149	.056	.023	.922	.987	**.989**
Measurement weights	**550.8**	**448**	.001	1.230	.079	.028	.912	.980	**.982**
Structural weights	**597.0**	**460**	.000	1.298	.133	.032	.905	.974	**.976**
Structural residuals	**623.9**	**466**	.000	1.339	.141	.034	.900	.970	**.973**
Measurement residuals	**910.0**	**489**	.000	1.861	.129	.055	.855	.924	**.927**

The first model in the group reported in the AMOS output as shown in Table 4.33 is the configural/baseline model for which all parameters are free estimated across the two groups simultaneously; that is, no parameters are constrained equal across the two groups(above/under average EP). This multi-group model yields a $\chi 2$ value of 489.3 with 426 degrees of freedom and serves as the baseline model against which all subsequent models are compared. In the structural weights model where all structural paths coefficient were constrained equal across the two groups, analyses reveal a $\chi 2$ value of 597.0 with 460 degrees of freedom. Computation of the $\Delta\chi 2$ value between this model and the configural model yields a difference of 107.7 with 34 degrees of freedom. This $\chi 2$ difference value is statistically significant at a probability of less than 0.001. Based on these results, the hypothesis of invariance across the group of interest is rejected. In other words, it can be concluded that one or more of the structural path coefficients is not operating equivalently across the two groups (this is illustrated later in the hypothesis testing section). Similarly, $\Delta\chi 2$ values belonging to each of the increasingly more constrained models confirm a steady augmentation of this differential.

Generally, then, if the traditional invariance-testing approach based on the $\chi 2$ difference test was used as the basis for evidence of equivalence, it can be concluded that the full structural equation model shown in Figure 4.9 is completely non-equivalent across the two groups of interest (above/under average employee productivity). Additionally**,** Cheung and Rensvold (2002) confirmed that CFI difference (ΔCFI) value should exceed the value of -0.01 to have evidence that the hypothesis of invariance across the group of interest should be rejected. Analyses here reveal a CFI value of 0.989 for the baseline model and a value of .976 for the structural weight model. Computation of the

ΔCFI value between this model and the configural model yields a difference of 0.013 which exceeds the cut off value of -0.01 and confirm that the full structural equation model shown in Figure 4.9, is completely nonequivalent across the two groups of interest (above/under average employee productivity).

E- Hypothesis testing

After having clear evidence that the full structural paths coefficient is completely non-equivalent across the two groups of interest (above/under average employee productivity), this section presents the results of testing the same hypotheses across the two groups (above/under average employee productivity) in order to identify the source of non-equivalence. Table 4.34 summarizes the results of the hypothesis testing across the two groups.

It was hypothesized that the QMPs (top management leadership (TML) , employee management (EM), customer focus (CF), supplier management (SM), quality data and reporting (QD&R), and process management (PM) are positively associated with the employee productivity as indicator of financial performance, as previously discussed and proposed respectively as H3, H4, H5, H6, H7, and H8.

The relationships between quality management practices with employee productivity (above/under average employee productivity) as an indicator of financial performance

An examination of the Amos output regarding the path coefficients and the related P-value related to the model in Figure 4.10, which tests the relationships between QMPs and above average employee productivity (competitive advantage), indicates that only four out of six QMPs (TML, EM, CF, and SM) have a direct positive and significant relationship with the firm above average employee productivity. These significant relationships reject the null hypothesis (estimates equal zero). More specifically, the path coefficient between TML and above average employee productivity is 0.43 with a high significance P-value ($P<0.001$), leading to rejection of the null hypothesis and indicates that TML has a positive direct effect on above average employee productivity.

Table 4-34: Hypothesised relationships, Standardised Regression Weights, P-values, and null hypothesises rejected /fail to be rejected (QM & above-under EP).

		Above average EP (competitive advantage)			Under average EP		
	Hypothesised Relationships	Stand. est.	*P*	Null hypothesis (estimate equals zero)	Stand. esti.	*P*	Null hypothesis (estimate equals zero)
H3	EP <---- TML	.43	***	reject	.10	.33	fail to reject
H4	EP <---- EM	.22	*	reject	.16	.082	fail to reject at probability level (p)< .05 but rejected at (p) ≤ 0.1
H5	EP <---- CF	.21	*	reject	.38	***	reject
H6	EP <---- SM	.25	*	reject	-.09	.428	fail to reject
H7	EP <---- PM	-.26	*	fail to reject	.28	*	reject
H8	EP <---- QD&R	-.05	.614	fail to reject	-.11	.215	fail to reject
H3a	CF <---- TML	.33	***	reject	.35	***	reject
H3b	EM <---- TML	.21	.063^{+}	fail to reject at probability level (p)<.05 but rejected at (p) ≤ 0.1	.57	***	reject
H3c	SM <---- TML	.22	.053^{+}	fail to reject at probability level (p)< .05 but rejected at (p) ≤ 0.1	.28	***	reject
H3d	QD&R <---- TML	.28	**	reject	.33	**	reject
H3e	PM <---- TML	.32	***	reject	.29	***	reject
H4a	CF <---- EM	-.04	.669	fail to reject	.38	***	reject
H4b	PM <---- EM	.06	.524	fail to reject	.20	**	reject
H6a	PM <---- SM	.46	***	reject	.47	***	reject
H7a	EM <---- QD&R	.12	.319	fail to reject	.17	*	reject
H7b	CF <---- QD&R	.24	***	reject	.11	.128	fail to reject
H7c	SM <---- QD&R	.14	.277	fail to reject	.47	***	reject
H8a	QD&R <---- PM	.29	*	reject	.26	.051	fail to reject

*****Correlation is significant at the 0.00 level; ** Correlation is significant at the 0.01 level; * Correlation is significant at the 0.05 level; $^{+}$ Correlation is significant at the 0. 1 level; TML: Top Management Leadership; EM: Employee Management; CF: Customers Focus; SM: Supplier Management; QD&R: Quality Data and Reporting; PM: Process Management.**

Additionally, the path coefficient between variable EM and above average employee productivity is 0.22 with an acceptable significance P-value (P<0.05), which rejects the null hypothesis and indicates that EM has a positive direct effect on above average employee productivity. Moreover, the path coefficient between variable CF and above average employee productivity is 0.21 with an acceptable significance P-value (P<0.05), which rejects the null hypothesis and indicates that CF has a positive direct effect on above average employee productivity. Furthermore, the path coefficient between variable SM and above average employee productivity is 0.25 with an acceptable significance P-value (P<0.05), which rejects the null hypothesis and indicates that SM has a positive direct effect on above average employee productivity.

Two out of six QMPs (PM and QD&R) do not have a positive impact on above average employee productivity directly. More specifically, the path coefficient between the variable PM and above average employee productivity is negative and significant (-0.26, P<0.05). This relationship is not in the expected positive direction, which indicates that a positive direct effect of PM on above average employee productivity is not supported. Similarly there is a small negative and insignificant path coefficient between QD&R and above average employee productivity (- 0.05, P=0.614), which indicates that a positive effect of SM on FP was not supported at the probability level (P) <.05.

The previous results presented the standardised direct effects of QMPs on above average employee productivity, while there are indirect effects of QMPs on above average employee productivity (as an indicator of financial performance) as presented in Table 4.35. The table illustrates both the direct and indirect effects among those variables. Based on this data, it can be concluded that the indirect impact of QMPs on above average employee productivity does not make any significant difference to the previously mentioned direct relationships.

On the other hand, Table 4.34 shows as well the direct impact of QMPs on under average employee productivity as pictured in figure 4.11 and summarised in Table 4.30. An examination of the path coefficients and the related P-values related to the model in Figure 4.11, which tests the relationships between QMPs and under average employee productivity, indicates that only three out of six QMPs (CF, PM, and EM) have a positive direct and significant relationship with under average employee productivity. These significant relationships reject the null hypothesis (estimates equal zero). More specifically, the path coefficient between CF and under average employee productivity is 0.38 with a high significance P-value ($P<0.001$), leading to rejection of the null hypothesis and indicating that CF has a positive direct impact on under average employee productivity. Additionally, the path coefficient between PM and under average employee productivity is 0.28 with an acceptable significance P-value ($P<0.05$), leading to rejection of the null hypothesis and indicating that PM has a positive direct impact on under average employee productivity. In a similar way there is a small positive and weak significant path coefficient between EP and under average employee productivity (0.16, P=0.08), which indicates that the direct effect of EP on under average employee productivity is supported at probability level (P) <0.1.

The other three out of six QMPs (TML, SM, and QD&R) are not found to have a positive significant impact on under average employee productivity directly. More specifically, the path coefficient between the variables TML and under average employee productivity was small and insignificant (0.11, P=0.33), indicating that a direct effect of TML on under average employee productivity is not supported. Additionally, both SM and QD&R do not have a negative and insignificant direct impact on under average employee productivity (-0.09, P =0.428; -0.11, P= 0.215) respectively, which indicates that the positive direct effect of SM on under average employee productivity and the effect of QD&R on under average employee productivity, respectively are not supported. Table 4.34 summarizes the results of the hypothesis testing.

The previous results presented the standardised direct effects of QMPs on under average employee productivity, while there are indirect effects of QMPs on under average employee productivity (as indicator of financial performance) as presented in Table 4.35. This table illustrates both the direct and indirect effects among those variables. Based on this data, it can be concluded that some previously rejected direct relationships between QMPs and under average employee productivity are indirectly supported. More specifically, TML has a positive indirect effect on under average employee productivity through CF, EM, SM, PM, and QD&R.

Table 4-35: R^2, direct, indirect and total effects among research variables for the two group of interest (above/under average EP)

Criterion variable	Predictor var.	Direct effect	Indirect effect	Total effect	Criterion variable	Predictor var.	Direct effect	Indirect effect	Total effect
Above average employee productivity (competitive advantage) R^2 = (39)	**TML**	**.43**	**.088**	**.518**	**Under average employee productivity R^2 = (45)**	**TML**	**.10**	**.433**	**.533**
	EM	**.22**	**-.02**	**.20**		**EM**	**.16**	**.192**	**.352**
	CF	**.21**	**000**	**.21**		**CF**	**.38**	**000**	**.38**
	SM	**.25**	**-.109**	**.141**		**SM**	**-.09**	**.131**	**.041**
	PM	**-.26**	**.021**	**-.239**		**PM**	**.28**	**.003**	**.283**
	QD&R	**-.05**	**.124**	**.074**		**QD&R**	**-.11**	**.124**	**.014**

According to this result, this indirect effect increases the standardised direct path coefficient between the two variables from 0.10 to 0.533 (roughly more than five times). In the same way, EM has a positive indirect effect on under average employee productivity through CF and PM. According to this result, this indirect effect increases the standardised direct path coefficient between the two variables from 0.16 to 0.35 (approximately double). Finally both the negative direct and insignificant relationship between SM and QD&R with under average employee productivity was changed to a positive but very small indirect relationship, as shown in Table 4.35. The indirect effect of SM on under average EP through PM increases the standardised direct path coefficient between the two variables from 0.09 to 0.041, and the indirect effect of QD&R on under average EP through CF, EM, and SM increases the standardised direct path coefficient between the two variables from -.11 to .014.

Inter-relationships among quality management practices:

The central focus of the current study is to investigate the relationship between QMPs and competitive advantage (measured as above average financial performance). However, the interrelationships among the QMPs presented in Table 4.34 show that the path coefficients and the related P-value related to the model in Figure 4.10 indicate that the null hypotheses (estimates equal zero) of H3a, H3d, H3e, H6a, H7b, and H8a were rejected, while the null hypotheses of H3b, H3c, H4a, H4b, H7a, and H7c are failed to be rejected

On the other hand, the path coefficients and the related P-value related to the model in Figure 18 indicate that the null hypotheses (estimates equal zero) of H3a, H3b, H3c, H3d, H3e, H4a, H4b, H6a, and H7a are rejected, while, the null hypotheses of H7b, and H8a are failed to be rejected.

F- Models modification and validation

As previously discussed and summarized in Table 4.32, both models fit the data well so there is no need to perform any *specification search* to obtain a better fit (Kline, 2011). Two further techniques are used in the current study for model validation. While the first technique, uses some indexes such as expected cross-validation index (ECVI), Bayesian information criterion (BIC), and Akaike information criterion (AIC) to compare alternative models using only one single sample of data, the second technique bootstraps the original data to reproduce multiple subsamples and create bootstrap estimates and standard errors. The bootstrap estimator and related confidence interval are employed to decide how stable the sample statistic is as an estimate of the whole population (Byrne, 2010) (see Model modification and validation Section 3.5.2.2.6).

As shown in Table 4.36, the values of ECVI, BIC, and AIC in the two hypothesized models (above and under average employee productivity) are smaller than the same values in the saturated model and the independence model, which indicates that the hypothesized models are the most stable in the population (Schumacher and Lomax, 2010). Additionally, Bootstrap ML (maximum likelihood) was performed in a number of 1000 bootstrap samples with 95 percentile confidence interval. Selected AMOS output of the bootstrap estimates, standard error, mean bias, and confidence interval (P) are presented in Table 4.37.

There are no large differences between the original data parameter estimates, standard error, and P values presented in Tables 4.31 and 4.34 and the bootstrap estimates and standard error presented in Table 4.37, that is, the difference are very small. Additionally, the information provided in the *Bias* column in Table 4.37 represents the difference between the bootstrap mean estimate and the original sample estimate which is very small. Therefore, the results can be interpreted as being stable estimates of the whole population.

Table 4-36: Amos output comparing different models values of EVCI, BIC, and AIC related to the two models that investigates the effect of QMPs on above/under employee productivity

	Above average employee productivity (competitive advantage)			under average employee productivity		
Models	**ECVI**	**BIC**	**AIC**	**ECVI**	**BIC**	**AIC**
Default (hypothesized) model	**3.084**	**517.238**	**345.413**	**2.275**	**595.228**	**395.847**
Saturated model (just identified model)	**4.929**	**1304.759**	**552.000**	**3.172**	**1425.481**	**552.000**
Independence model (null model, all correlations equal zero)	**20.885**	**2401.820**	**2339.090**	**23.075**	**4087.878**	**4015.088**

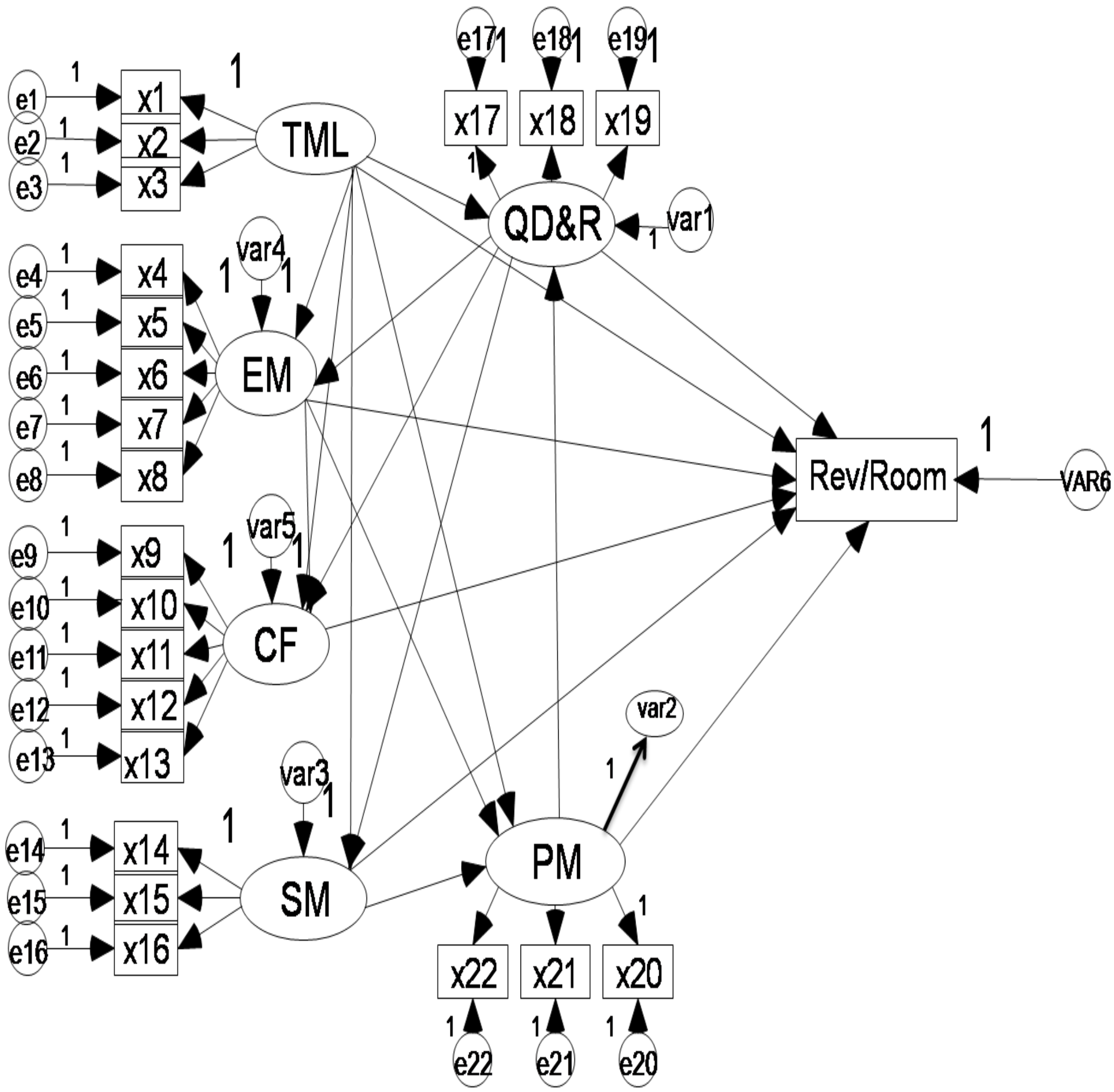
Table 4-37: Amos output: Bootstrap estimates, standard error, bias and confidence intervals (p) values related to the tow models that investigates the effect of QMPS on above/under employee productivity

	above average employee productivity				under average employee productivity			
	Estimates	**S.E.**	**Bias**	***P***	**Estimates**	**S.E.**	**Bias**	***P***
X3 ◄--- TML	**.922**	**.028**	**.000**	**.002**	**.866**	**.029**	**-.001**	**.002**
X2 ◄---- TML	**.913**	**.022**	**.000**	**.002**	**.899**	**.026**	**-.001**	**.002**
X1 ◄---- TML	**.843**	**.038**	**.003**	**.002**	**.858**	**.026**	**.001**	**.002**
X8 ◄------ EM	**.767**	**.049**	**-.002**	**.002**	**.876**	**.029**	**.001**	**.002**
X7 ◄------ EM	**.806**	**.048**	**.001**	**.002**	**.827**	**.032**	**.001**	**.002**
X6 ◄------ EM	**.841**	**.040**	**.000**	**.002**	**.828**	**.034**	**.001**	**.002**
X5 ◄------ EM	**.771**	**.047**	**.003**	**.002**	**.878**	**.024**	**.001**	**.002**
X4 ◄------ EM	**.843**	**.038**	**-.002**	**.002**	**.829**	**.034**	**.001**	**.002**
X13◄---- CF	**.896**	**.028**	**.000**	**.002**	**.863**	**.035**	**.000**	**.002**

X12 ◄----- CF	.889	.026	-.001	.002	.854	.027	.000	.002
X11 ◄----- CF	.909	.021	-.001	.002	.881	.027	.000	.002
X10 ◄----- CF	.870	.031	.000	.002	.887	.021	-.003	.002
X9 ◄----- CF	.886	.034	.000	.002	.851	.031	-.001	.002
X16 ◄----- SM	.624	.034	.003	.002	.948	.014	-.001	.002
X15 ◄----- SM	.890	.049	.004	.002	.892	.027	.000	.002
X14 ◄---- SM	.948	.111	-.003	.002	.844	.032	-.001	.002
X19 ◄-- QD&R	.782	.092	.008	.002	.946	.015	.001	.002
X18 ◄--- QD&R	.846	.040	-.002	.002	.938	.017	.000	.002
X17 ◄-- QD&R	.931	.034	.001	.002	.919	.018	-.001	.002
X22 ◄---- PM	.930	.018	.000	.002	.898	.021	-.001	.002
X21 ◄----- PM	.913	.021	-.001	.002	.917	.018	.000	.002
X20 ◄---- PM	.962	.014	-.001	.002	.879	.002	.000	.002
EP <---- TML	.425	.101	.018	.002	.098	.121	.004	.402
EP <---- EM	.220	.087	-.001	.019	.164	.144	-.001	.153
EP <---- CF	.212	.111	-.003	.050	.375	.085	.007	.002
EP <---- SM	.250	.101	-.006	.013	-.085	.108	.002	.424
EP <---- PM	-.259	.112	.004	.019	.278	.152	-.013	.050
EP <---- QD&R	-.053	.121	.004	.714	-.111	.102	.002	.269
CF ←-- TML	.334	.099	-.003	.002	.353	.108	-.002	.004
EM ←-- TML	.212	.135	-.011	.152	.565	.089	-.001	.002
SM ←-- TML	.212	.443	.034	.064	.287	.098	.004	.013
QD&R ←-- TML	.280	.129	-.017	.058	.325	.147	.000	.012
PM ←-- TML	.321	.103	-.004	.016	.293	.089	-.005	.007
CF <---- EM	-.03	.093	.000	.704	.360	.099	-.008	.002
PM <---- EM	.055	.117	-.002	.652	.204	.086	.009	.014
PM <---- SM	.458	.154	.018	.002	.466	.087	-.002	.002
EM <---- QD&R	.117	.133	.005	.381	.171	.089	.003	.045
CF <---- QD&R	.381	.096	-.001	.002	.110	.085	.009	.145
SM <---- QD&R	.144	.875	-.086	.355	.471	.094	-.004	.002
QD&R <---- PM	.291	.210	.023	.034	.261	.181	-.003	.139

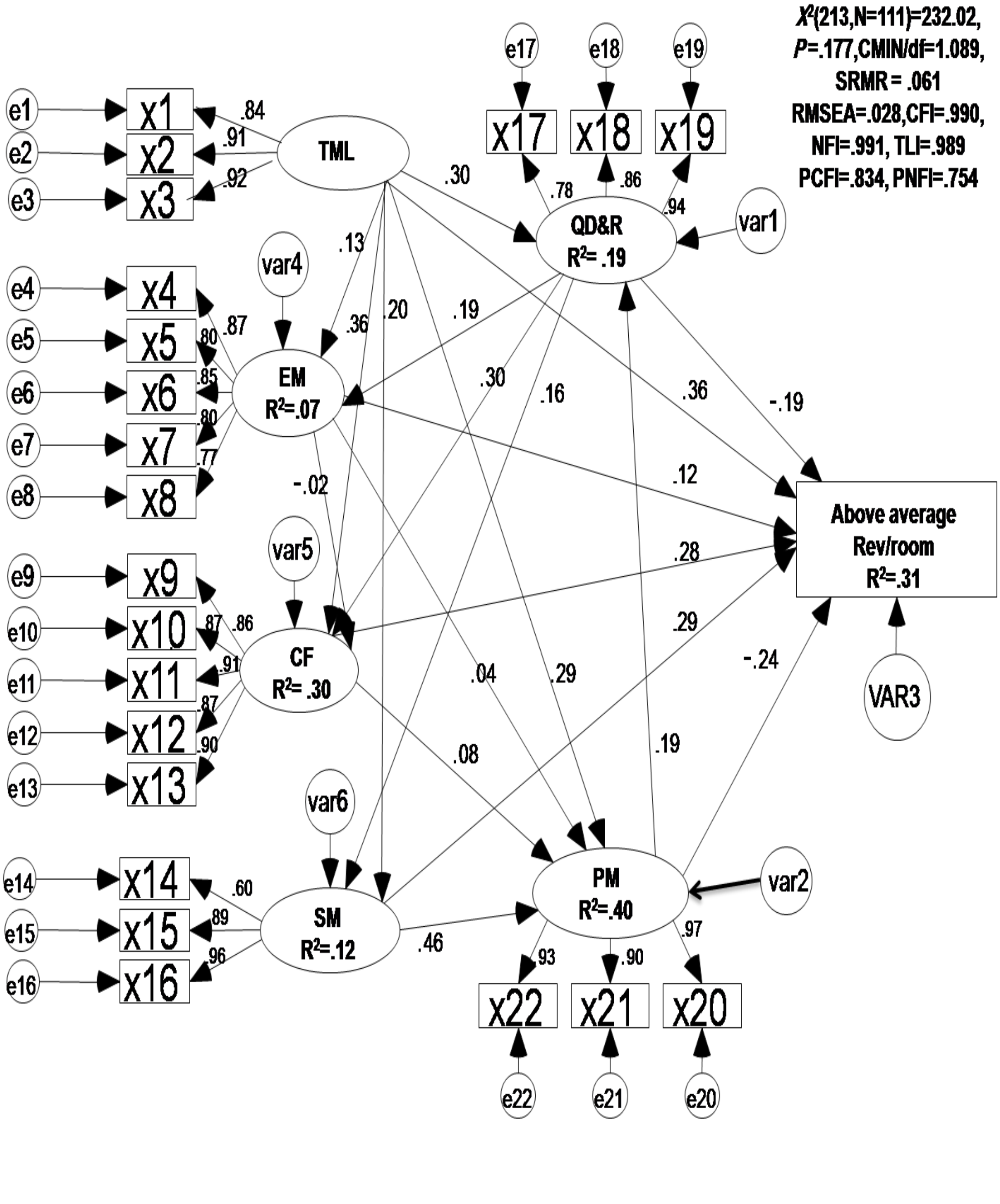
4.4.3.2.2 Testing the relationship between QM and revenue per –room

Figure 4-12: The impact of QM on revenue per room Model:



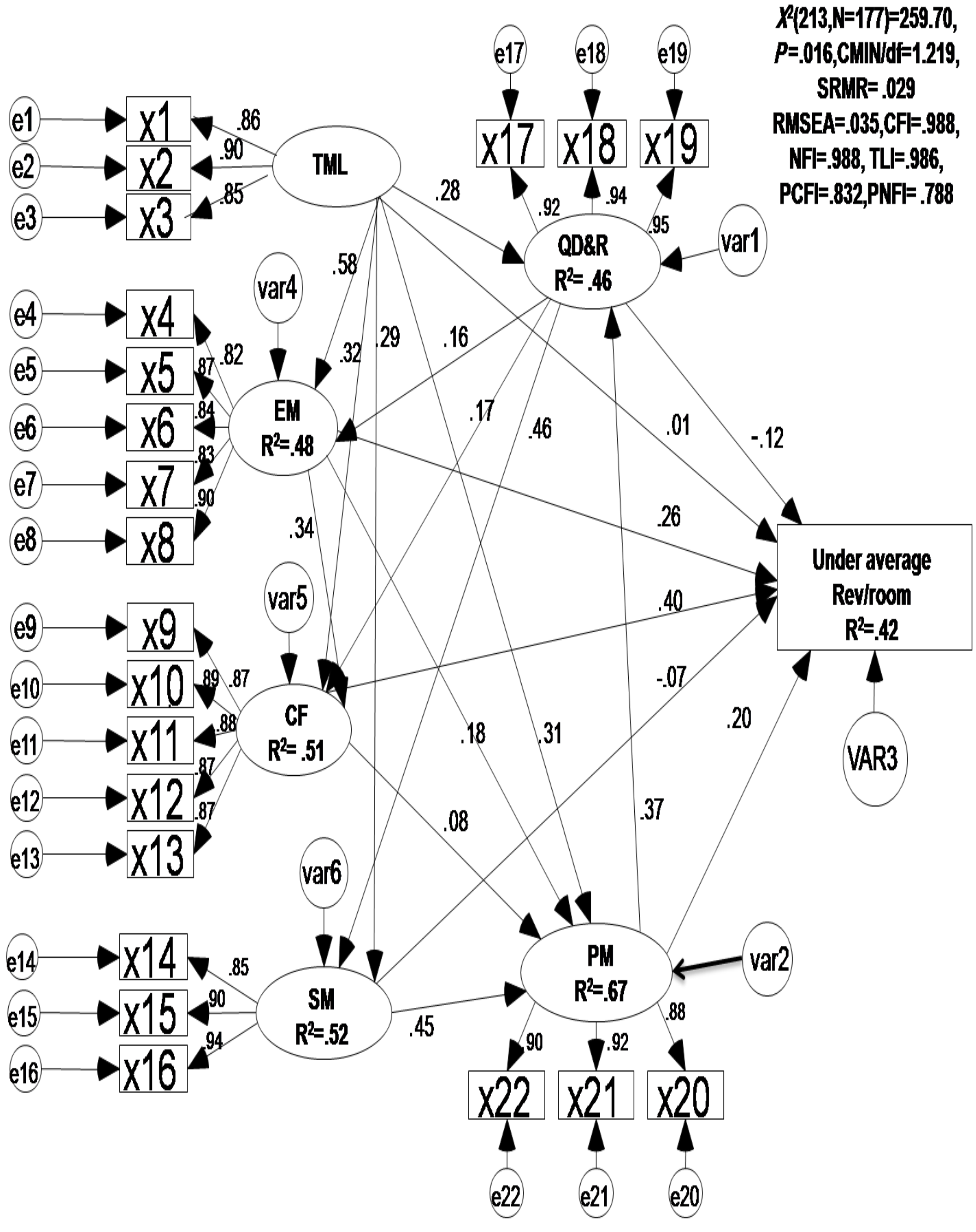
TML: Top Management Leadership; EM: Employee Management; CF: Customers Focus; SM: Supplier Management; QD&R: Quality Data and Reporting; PM: Process Management; Rev/room: revenue per room; X1: X22 quality management indicators, X1: X22 quality management indicators; e1-e24: Measurement error associated with the observed variables, var1- var6: Residual error in the prediction of an unobserved endogenous factors.

Figure 4-13: QM and above average revenue per room model



TML: Top Management Leadership; EM: Employee Management; CF: Customers Focus; SM: Supplier Management; QD&R: Quality Data and Reporting; PM: Process Management; X1: X22 quality management indicators, X1: X22 quality management indicators. e1-e24: Measurement error associated with the observed variables. Var1- var6: Residual error in the prediction of unobserved endogenous factors. The model also contains the paths coefficient between the factors and the factor loading from the factors to the observed variables.

Figure 4-14: QM and under average revenue per room model



TML: Top Management Leadership; EM: Employee Management; CF: Customers Focus; SM: Supplier Management; QD&R: Quality Data and Reporting; PM: Process Management; X1: X22 quality management indicators, X1: X22 quality management indicators, e1-e24: Measurement error associated with the observed variables. Var1- var6: Residual error in the prediction of unobserved endogenous factors. The model also contains the paths coefficient between the factors and the factor loading from the factors to the observed variables.

Following the procedures described in Byrne (2010) the model in Figure 4.12, which shows the relationships between QM and revenue per room (as an indicator of financial performance), is analysed in SEM separately for each group of interest (above average revenue per room and under average revenue per room) to calculate the goodness of fit for each model as shown in Figures 4.13 and 4.14. Then the same model as pictured in Figure 4.12 is tested in SEM for multi-group analysis simultaneously to find out whether or not the structural model (paths of the causal structure) is equivalent (i.e. invariant) across the previously mentioned two groups of interest.

All assumption (i.e. adequate sample size, dealing with missing data and outlier, normality, linearity, multicollinearity and singularity) are met as indicated in Sections 3.5.2.2.1, 4.2, and Section 4.3. All the direct and indirect relationships between quality management practices and revenue per room as indicators of financial performance (see research framework and hypotheses Section 2.3), are drawn and subjected to SEM as shown in Figure 4.12 .

The results of the above two models (Figures 4.13 and 4.14) are presented simultaneously in the following main sections: (a) Model and specification identification, (b) Model estimation, (c) Model Evaluation, (d) Multi-group analysis, (e) Hypotheses testing, and (f) Model modification and validation.

A- Model specification and Identification

The structure models (in Figures 4.13 and 4.14) consist of the regressions among the six quality management latent constructs: top management leadership (TML), employee management (EM), customer focus (CF), supplier management (SM), quality data and reporting (QD&R), and process management (PM), and the regressions between these six QM latent constructs with above average revenue per room (Figure 4.13) and under average revenue per room (Figure 4.14). These latent constructs are measured by using multi-item scales which constitute the measurement model section; each item has its related error term as shown in Figures 4.13 and 4.14.

In summary, results related to the model in Figure 4.13, which tests the relationships between QMPs and above average revenue per room (competitive advantage), indicate that there are 276 distinct sample moments, or, in other words, elements in the sample covariance matrix (i.e. number of pieces of information provided by the data). This can be calculated based on the formula p(p+1)/2 where p is the observed variables, therefore the data should be 276 (23[23]+1)/2), and there are 63 (34 regression weights and 29 variances) parameters to be estimated, thereby leaving 213 degrees of freedom based on an over identified model (see Table 4.38).

Turning to the model in Figure 4.14, there are 267 distinct sample moments, or, in other words, elements in the sample covariance matrix (i.e. number of pieces of information provided by the data). This can be calculated based on the formula p(p+1)/2 where p is the observed variables , therefore the data should be 267 (23[23]+1)/2), and there are 63 (34 regression weights and 29 variances) parameters to be estimated, thereby leaving 213 degrees of freedom based on an over identified model (See Table 4.38).

Table 4-38: Parameter summary of models in Figures 4.13 and 4.14

	QMPs and above average REV/Room (competitive advantage) model						QMPs and under average REV/Room model					
	Weights	Covariance	Variances	Means	Intercepts	Total	Weights	Covariance	Variances	Means	Intercepts	Total
Fixed	34	0	0	0	0	34	34	0	0	0	0	34
Labelled	0	0	0	0	0	0	0	0	0	0	0	0
Unlabelled	34	0	29	0	0	63	34	0	29	0	0	63
Total	68	0	29	0	0	97	68	0	29	0	0	97

B- Model estimation

All the factors that affect model estimation and often result in error messages (i.e. missing data, outliers, multicollinearity, nonnormality of data distributions) are considered and examined as discussed in Section 4.2 and Section 4.3 .

The data for the models is entered in AMOS v17 by using the ML estimation technique and AMOS Graphic was used to draw the measurement and structural paths collectively in the model as shown in Figures 4.13 and 4.14.

In the model in Figure 4.13, and the model in Figure 4.14, variables and parameters are equivalent, as in each single model, there are 68 *regression weights*, 34 of which are fixed (the first of each set of six factor loadings and the 22 error terms and the five factor variances and one indicator variance), 34 of which are estimated (16 factor loadings and 18 path coefficients). There are 29 *variances*, all of which are estimated, as shown in Table 4.38.

As shown in Table 4.39, there is no standardized parameters estimation exceeds the value of one and no negative error variance is found as well.

C- Model evaluation

The evaluation criteria focus on the adequacy of (a) the parameter estimates, and (b) the model as a whole.

First, regarding the adequacy of parameter estimates (See Table 4.39), all the critical ratio (C.R.) values (parameter estimate divided by its standard error) of both models of interest are greater than 1.96, which indicates that all the estimates are statistically different from zero, and there is an evidence to reject the null hypothesis (estimate equals 0.0, in other words, no relationship exists). Additionally, all the parameter estimates for both models are positive and within the logical anticipated range of values (i.e. no negative values obtained and no correlations exceed the value of 1.00) (see Table 4.39).

Second, for the model as a whole, the current study takes a confirmatory approach in which the researcher hypothesizes a specific theoretical model (from reviewing the literature), gathers data, and then tests whether the data fit the model. In this approach, the theoretical model is either accepted or rejected based on a chi-square statistical test of significance and meeting acceptable model fit criteria (see Section 3.5.2.2). The $\chi2$ GOF statistics provide an evidence that while the null hypothesis (model fits the data well) cannot be rejected in the model in Figure 4.13, (QMPs and above average revenue per room), it can be rejected in the other model in Figure 4.14 (QMPs and under average revenue per room). However, because the chi-square value depends on sample size and will almost always be significant with large samples (Harrington, 2009), other fit measures are also considered, as below:

The other goodness of fit measures related to both models (Figures 4.13 and 4.14), indicate that both fit the data well. For the model in Figure 4.13 (QMPs with above average revenue per room –competitive advantage-) $\chi2$ (213, *N*= 111) = 232.02, *P=.177* (Normed $\chi2$ *= 1.089, RMSEA= 0.028, SRMR= 0.061, CFI= 0.990, NFI=0.991, TLI= 0.989, PCFI=0.834, and PNFI =0.754).* While, for the model in Figure 4.14 (QMPs with under average revenue per room) $\chi2$ (213, *N*= 177) = 259.70, *P<0.01* (Normed $\chi2$ *= 1.219, RMSEA= 0.035, SRMR= 0.029, CFI= 0.988, NFI=.988, TLI= 0.986, PCFI=0.832, and PNFI =0.788).* However, the model in Figure 4.13 fit the data better than the model in Figure 4.14. Table 4.40 shows the goodness of fit measures for both models.

Table 4-39: Summary of model fit indices for the proposed two models (QMPs with above/under average revenue per room).

Obtained fit indices															
GOF measures for QMPs and above average REV/ROOM (competitive advantage) model								GOF measures QMPs and under average REV/ROOM model							
AFM			IFM			PFM		AFM			IFM			PFM	
$\chi2$/df	RMSEA	SRMR	CFI	NFI	TLI	PNFI	PCFI	$\chi2$/df	RMSEA	SRMR	CFI	NFI	TLI	PNFI	PCFI
11.089	.028	.061	.990	.991	.989	.834	.754	11.219	.035	.029	.988	.988	.986	.832	.788
Suggested fit indices															
≤5	≤0.05;≤.08	≤.05	≥0.90	≥0.90	≥0.90	≥0.5	≥0.5	≤ 5	≤0.05-≤.08	≤.08	≥0.90	≥0.90	≥0.90	≥0.5	≥0.5

Table 4-40: The paths coefficients, variances and R^2 of both the measurement Models (QMPs with above/under average revenue per room).

QMPs and above average revenue per room (competitive advantage)												QMPs and under average revenue per room										
	Regression Weight						Variance					Regression Weight						Variance				
	Stand. Est.	Unsta. Est.	S.E.	C.R.	P	R^2		Est.	S.E.	C.R.	P	Stand. Est.	Unsta. Est.	S.E.	C.R.	P	R^2		Est.	S.E.	C.R.	P
X3 ←--- TML	.82	.915	.073	12.4	***	.85	e1	.796	.131	6.083	***	.85	.959	.067	14.3	.959	.72	e1	.651	.097	6.682	***
X2 ←---- TML	.91	1.001	.067	14.9	***	.83	e2	.441	.102	4.308	***	.90	1.028	.066	15.4	***	.81	e2	.512	.092	5.585	***
X1 ←---- TML	.84	1.000				.69	e3	.380	.098	3.882	***	.86	1.000				.74	e3	.774	.110	7.010	***
X8 ←------ EM	.77	1.127	.118	9.52	***	.58	e4	.429	.082	5.230	***	.90	.815	.056	14.5	***	.79	e4	.961	.120	8.039	***
X7 ←------ EM	.80	.970	.114	8.48	***	.64	e5	.596	.098	6.066	***	.83	.887	.054	16.4	***	.69	e5	.731	.100	7.290	***
X6 ←------ EM	.85	1.131	.120	9.43	***	.72	e6	.500	.092	5.462	***	.84	.782	.052	15.0	***	.69	e6	.791	.100	7.874	***
X5 ←------ EM	.80	.978	.112	8.69	***	.63	e7	.549	.090	6.074	***	.87	.812	.054	14.9	***	.76	e7	.864	.109	7.904	***
X4 ←------ EM	.87	1.000				.75	e8	.718	.112	6.394	***	.82	1.000				.67	e8	.781	.113	6.909	***
X13←---- CF	.90	.988	.077	12.9	***	.79	e9	.901	.146	6.180	***	.87	.944	.060	15.8	***	.75	e9	.844	.109	7.705	***
X12 ←---- CF	.87	.935	.071	13.2	***	.76	e10	.768	.125	6.143	***	.87	.864	.052	16.5	***	.75	e10	.584	.080	7.298	***
X11 ←---- CF	.91	.975	.066	14.7	***	.83	e11	.515	.096	5.356	***	.88	.914	.056	16.2	***	.77	e11	.714	.096	7.464	***
X10 ←---- CF	.87	.981	.073	13.3	***	.75	e12	.811	.133	6.095	***	.89	.841	.054	15.7	***	.78	e12	.662	.087	7.652	***
X9 ←---- CF	.86	1.000				.74	e13	.685	.118	5.793	***	.87	1.000				.75	e13	.928	.121	7.643	***
X16 ←---- SM	.96	.526	.074	7.12	***	.91	e14	1.25	.175	7.164	***	.94	.831	.047	17.5	***	.89	e14	.589	.076	7.741	***
X15 ←---- SM	.89	.822	.072	11.4	***	.78	e15	.464	.130	3.569	***	.90	.833	.043	19.3	***	.80	e15	.391	.060	6.492	***
X14 ←--- SM	.60	1.000				.35	e16	.222	.165	1.342	.180	.89	1.000				.72	e16	.281	.066	4.281	***
X19 ←-- QD&R	.78	.854	.079	10.7	***	.87	e17	1.21	.191	6.361	***	.95	.980	.042	23.5	***	.89	e17	.579	.085	6.835	***
X18 ←--- QD&R	.86	.890	.072	12.3	***	.73	e18	.731	.144	5.059	***	.94	.975	.039	24.9	***	.88	e18	.457	.075	6.109	***
X17 ←-- QD&R	.84	1.000				.61	e19	.379	.141	2.688	.007	.92	1.000				.85	e19	.394	.072	5.453	***
X22 ←--- PM	.93	1.142	.057	20.1	***	.85	e20	.215	.080	2.687	.007	.90	.997	.059	16.8	***	.80	e20	.902	.126	7.145	***
X21 ←---- PM	.90	1.008	.062	16.2	***	.81	e21	.607	.100	6.045	***	.92	1.003	.054	18.7	***	.84	e21	.568	.097	5.857	***
X20 ←--- PM	.97	1.000				.94	e22	.425	.082	5.182	***	.88	1.000				.76	e22	.734	.110	6.668	***
							Var6	5.00	.710	7.042	***							Var6	**3.60**	**.390**	**9.230**	

D- Multi-group analysis

The automated multi-group approach was employed in SEM, to find out whether or not the structural model (paths of the causal structure) are equivalent (i.e. invariant) across the previously mentioned two groups of interest (above and under revenue per room) (see Section 3.5.2.2). The number of factors and the factor-loading pattern are the same across groups; as such, no equality constraints are forced on any of the parameters (Byrne, 2010). Thus, the same parameters that were estimated in the baseline model for each group separately (as previously discussed in the models in Figures 4.13 and 4.14) are once more estimated in this multi-group model. In essence, then, the model can be considered as being tested here as a multi-group representation of the baseline models. Accordingly, it incorporates the baseline models for above and under average revenue per room within the same file. This model is commonly termed as the *configural model* (Byrne, 2010; and Hair et al., 2006). Goodness of model fit values of this configural/baseline model (no equality constrains imposed) provide the baseline values which are compared against four subsequently specified constrained models (structural weights, measurement weights, measurement residuals, and structural residuals) (Byrne, 2010) (see Table 4.41).

Evidence of invariance can be based on CFI difference (ΔCFI) values versus the more traditional $\chi 2$ difference ($\Delta\ \chi 2$) values (see Section 3.5.2.2). Because the central concern is whether or not components of the structural model are equivalent (i.e. invariant) across the two groups of interest, the CFI and $\chi 2$ values of the unconstrained/baseline model are compared to the same values in the structural weights model (structural paths coefficients are constrained equal across groups) to find out if the differences between the two models are significant and consequently which structural path coefficients are not operating equivalently across the two groups. In other words, it gives the answer to which QMPs can generate competitive advantage. Table 4.41 shows the results of the previously mentioned five models.

Table 4-41: Goodness-of fit measures for the five models

Model	CMIN	DF	P	CMIN/ DF	SRMR	RMSEA	NFI	TLI	CFI
Unconstrained (configural model)	**491.87**	**426**	.015	1.550	.061	.023	.989	.987	**.989**
Measurement weights	**551.24**	**448**	.001	1.230	.080	.028	.982	.980	**.982**
Structural weights	**599.42**	**460**	.000	1.303	.146	.033	.976	.974	**.976**
Structural residuals	**622.18**	**466**	.000	1.335	.150	.034	.973	.971	**.973**
Measurement residuals	**954.50**	**489**	.000	1.952	.156	058	.920	.917	**.920**

The first model in the group reported in the AMOS output as shown in Table 4.41 is the configural/baseline model for which all parameters are free estimated across the two groups simultaneously; that is; no parameters are constrained equal across the two groups(above/under average revenue per room). This multi-group model yielded a $\chi2$ value of 491.8 with 426 degrees of freedom and serves as the baseline model against which all subsequent models are compared. In the structural weights model where all structural path coefficients were constrained equal across the two groups, analyses reveals a $\chi2$ value of 599.4 with 460 degrees of freedom. Computation of the $\Delta\chi2$ value between this model and the configural model yields a difference of 107.6 with 34 degrees of freedom .This $\chi2$ difference value is statistically significant at a probability of less than 0.001. Based on these results, it can be concluded that one or more of the structural path coefficients is not operating equivalently across the two groups (this is illustrated further in the hypothesis testing section). Similarly, $\Delta\chi2$ values belonging to each of the increasingly more constrained models that follow confirm a steady augmentation of this differential. Additionally**,** computation of the ΔCFI value between the baseline model (0.989) and the structural weight model (0.976) yields a difference of 0.013, which exceeds the cut off value of -0.01 as recommended by Cheung and Rensvold (2002). This confirms that the full structural equation model shown in Figure 4.12 is completely non-equivalent across the two groups of interest (above/under average revenue per room).

E- Hypotheses testing

After having clear evidence that the full structural path coefficients are completely non-equivalent across the two groups of interest (above/under average revenue per room). This section presents the results of testing the same hypotheses across the two groups (above/under average revenue per room) in order to identify the source of non-equivalence. Table 4.42 summarizes the results of the hypotheses testing across the two groups.

The relationship between quality management and revenue per room as an indicator of financial performance

It is hypothesized that the QM dimensions: top management leadership (TML), employee management (EM), customer focus (CF), supplier management (SM), quality data and reporting (QD&R), and process management (PM) have a positive effect on revenue per room as an indicator of financial performance as explained and proposed as H3, H4, H5, H6, H7, and H8 respectively.

Table 4-42: Hypothesised relationships, Standardised Regression Weights, P-values, and null hypothesise supported/rejected of QMPs effect on above/under average revenue per room.

		Above average revenue per room (competitive advantage)			Under average revenue per room		
	Hypothesised Relationships	**Stand. est.**	***P***	**Null hypothesis (estimate equals zero)**	**Stand. est.**	***P***	**Null hypothesis (estimate equals zero)**
H3	**Rev/room <---- TML**	**.36**	*******	**reject**	**.01**	**.19**	**fail to reject**
H4	**Rev/room <---- EM**	**.12**	**.10**	**fail to reject at probability level (p)< .05 but rejected at (p) ≤ 0.1**	**.26**	******	**reject**
H5	**Rev/room <---- CF**	**.28**	******	**reject**	**.40**	*******	**reject**
H6	**Rev/room <---- SM**	**.29**	******	**reject**	**-.07**	**.519**	**fail to reject**
H7	**Rev/room <---- PM**	**-.24**	*****	**fail to reject**	**-.12**	**.118**	**fail to reject**
H8	**Rev/room <--QD&R**	**-.19**	**.067**	**fail to reject**	**.20**	**.213**	**fail to reject**
H3a	**CF <---- TML**	**.36**	*******	**reject**	**.32**	*******	**reject**
H3b	**EM <---- TML**	**.13**	**.250**	**fail to reject**	**.58**	*******	**reject**

H3c	**SM <---- TML**	**.20**	**.076**	**fail to reject at probability level (p)< .05 but rejected at (p) ≤ 0.1**	**.29**	*******	**reject**
H3d	**QD&R <---- TML**	**.30**	******	**reject**	**.28**	******	**reject**
H3e	**PM <---- TML**	**.29**	*******	**reject**	**.31**	*******	**reject**
H4a	**CF <---- EM**	**-.02**	**.860**	**fail to reject**	**.34**	*******	**reject**
H4b	**PM <---- EM**	**.04**	**.650**	**fail to reject**	**.18**	*****	**reject**
H6a	**PM <---- SM**	**.46**	*******	**reject**	**.45**	*******	**reject**
H7a	**EM <---- QD&R**	**.19**	**.096**	**fail to reject at probability level (p)< .05 but rejected at (p) ≤ 0.1**	**.16**	*****	**reject**
H7b	**CF <---- QD&R**	**.30**	******	**reject**	**.17**	*****	**reject**
H7c	**SM <---- QD&R**	**.16**	**.20**	**fail to reject**	**.46**	*******	**reject**
H8a	**QD&R <---- PM**	**.19**	**.125**	**fail to reject**	**.37**	******	**reject**

*****Correlation is significant at the 0.00 level; ** Correlation is significant at the 0.01 level; * Correlation is significant at the 0.05 level; TML: Top Management Leadership; EM: Employee Management; CF: Customers Focus; SM: Supplier Management; QD&R: Quality Data and Reporting; PM: Process Management.**

An examination of the path coefficients and the related P-value related to the model in Figure 4.13, which tests the relationships between QMPs and above average revenue per room (competitive advantage), indicates that only four out of six QMPs (TML, EM, CF, and SM) have direct positive and significant effect on the firm above average revenue per room. These significant relationships reject the null hypothesis (estimates equal zero). More specifically, the path coefficient between TML and above average revenue per room is 0.36 with a high significance P-value (P<0.001), that rejects the null hypothesis and indicates that TML has a positive direct effect on above average revenue per room. Moreover, the path coefficient between variable CF and above average revenue per room is .28 with a strong significance P-value (P<0.01), which rejects the null hypothesis and indicates that that CF has a positively direct impact on above average revenue per room. Furthermore, the path coefficient between variable SM and above average revenue per room is 0.29 with a strong significance P-value (P<0.01), which rejects the null hypothesis and indicates that SM has a positive effect on above average revenue per room. Additionally, there is a small positive and weak significant (P $\leq$0.1) path coefficient between EM and above average revenue per room (0.12, P=0.10), which rejects the null hypothesis and indicates that, the direct effect of EM on above average revenue per room is supported.

Two out of six QMPs (PM, and QD&R) do not have a positive significant relationship with above average revenue per room directly. More specifically, the path coefficient between the variables PM and above average revenue per room is negative but significant (-0.24, P<.05). This relationship is not in the expected positive direction, which indicates that the positive direct effect of PM on above average revenue per room is not supported. Similarly there is a negative and insignificant path coefficient between QD&R and above average revenue per room (- 0.19 P=0.67). This relationship is not in the expected positive direction, which indicates that the positive direct effect of QD&R on above average revenue per room is not supported (Table 4.42 summarize the results of the hypotheses testing).

The previous results represents the standardised direct effects of QMPs on above average revenue per room, while there are indirect effects of QMPs on above average revenue per room (as an indicator of financial performance) as presented in Table 4.43. This table illustrates both the direct and indirect effects among those variables. Based on this data, TML has a small positive indirect effect (0.058) on above average revenue per room through CF, EM, SM, PM, and QD&R (see Figure 4.12). According to this result, this indirect effect slightly increases the standardised direct path coefficient between the two variables from .38 to .438. In the same way, QD&R has a small positive indirect effect (0.13) on above average revenue per room through CF, and EM, and SM. According to this result, this indirect effect decreases the negative standardised direct path coefficient between the two variables from -0.19 to -0.058. Indirect effects of EM, SM, and PM on above average revenue per room do not make any significant difference to the previously mentioned direct relationships.

On the other hand, Table 4.42 shows as well the direct impact of QMPs on under average revenue per room as pictured in Figure 4.14 and summarised in Table 4.42. An examination of the path coefficients and the related P-value related to the model in

Figure 4.14, which tests the relationships between QMPs and under average revenue per room, indicates that only two (EM, and CF) out of six QMPs had a positive direct and significant impact on under average revenue per room . These significant relationships reject the null hypothesis (estimates equal zero). More specifically, the path coefficient between EM and under average revenue per room is 0.26 with a strong significance P-value (P<0.01), which rejects the null hypothesis and indicates that EM has a positive direct effect on under average revenue per room. Additionally, the path coefficient between variable CF and under average revenue per room is 0.40 with a high significance P-value (P<0.001), which rejects the null hypothesis and indicates that CF has a positive direct effect on under average revenue per room.

Four out of six QMPs (TML, SM, PM, and QD&R) do not have a positive significant impact on under average revenue per room directly. More specifically, the path coefficient between the variables TML and under average revenue per room is small and insignificant (0.01, P=0.19), indicating that the direct effect of TML on under average revenue per room is not supported. In a similar way there is a positive but insignificant path coefficient between QD&R and under average revenue per room (0.20, P=0.213), indicating that the direct effect of QD&R on under average revenue per room is not supported. Additionally, both SM and PM have a negative and insignificant direct impact on under average revenue per room (-0.07, P =0.519; -0.12, P= 0.118) respectively (Table 4.42 summarizes the results of the hypotheses testing).

The previous results represents the standardised direct effects of QMPs on under average revenue per room, while (as hypothesized before) there are indirect effects QMPs on under average revenue per room (as an indicator of financial performance). Table 4.43 illustrates both the direct and indirect effects among those variables.

Table 4-43: $R^{2,}$ direct, indirect and total effects among research variables for the two group of interest (above/under average EP)

Criterion variable	Predictor variables	Direct effect	Indirect effect	Total effect	Criterion variable	Predictor variables	Direct effect	Indirect effect	Total effect
Above average revenue per room (competitive advantage) R^2 = (31)	**TML**	**.38**	**.058**	**.438**	**Under average revenue per room R^2 = (42)**	**TML**	**.01**	**.464**	**.474**
	EM	**.12**	**-.014**	**.106**		**EM**	**.28**	**.174**	**.454**
	CF	**.28**	**000**	**.28**		**CF**	**.40**	**000**	**.40**
	SM	**.29**	**-.013**	**.277**		**SM**	**-.07**	**.094**	**.024**
	PM	**-.24**	**-.011**	**-.251**		**PM**	**.20**	**.01**	**.21**
	QD&R	**-.19**	**.132**	**-.058**		**QD&R**	**-.12**	**.15**	**.03**

According to Table 4.43, it can be concluded that the rejected direct relationships between TML and under average revenue per room is indirectly supported. More specifically, TML has a positive indirect effect on under average revenue per room through CF, EM, SM, PM, and QD&R. According to this result, this indirect effect (0.464) increases the standardised direct path coefficient between the two variables from 0.01 to 0.474. In the same way, EM has a positive indirect effect (0.174) on under average revenue per room through CF, and PM. According to this result, this indirect effect increases the standardised direct path coefficient between the two variables from 0.28 to 0.454. Finally both the negative direct and insignificant relationship between SM and QD&R with under average revenue per room is changed to a positive but very small indirect relationship respectively as shown in Table 4.43. The indirect effect of SM on under average revenue per room (0.094) through PM increases the standardised direct path coefficient between the two variables from -0.07 to 0.024, and the indirect effect of QD&R on under average revenue per room (0.15) through CF, EM, and SM increases the standardised direct path coefficient between the two variables from -0.12 to 0.03.

Inter-relationships among quality management practices:

The central focus of the current study is to investigate the relationship between QMPs and competitive advantage (measured as above average financial performance). However the interrelationships among the QMPs presented in Table 4.42 show that the path coefficients and the related P-values related to the model in Figure 4.13, indicates that that the null hypotheses (estimates equal zero) of H3a, H3d, H3e, H6a, and H7b, are rejected, while, the null hypotheses (estimates equal zero) of H3b, H3c, H4a, H4b, H7a, H7c, and H8a are failed to be rejected.

On the other hand, the path coefficients and the related P-value related to the model in Figure 4.14 indicate that the null hypotheses (estimates equal zero) of H3a, H3b, H3c, H3d, H3e, H4a, H4b, H6a, H7a, and H7b, and H8a are rejected.

F- Model modification and validation

As previously discussed and summarized in Table 4.40, both the previous models fit the data well, so there is no need to perform any *specification search* to obtain a better fit (Kline, (2011). Two further techniques are used in the current study for model validation. While the first technique, uses some indexes such as expected cross-validation index (ECVI), Bayesian information criterion (BIC), and Akaike information criterion (AIC) to compare alternative models using only one single sample of data, the second technique bootstraps the original data to reproduce multiple subsamples and create bootstrap estimates and standard errors. The bootstrap estimator and related confidence interval are employed to decide how stable the sample statistic is as an estimate of the whole population (Byrne, 2010) (see Model modification and validation Section 3.5.2.2.6).

As shown in Table 4.36, the values of ECVI, BIC, and AIC in the two hypothesized models (above and under average revenue per room) are smaller than the same values in the saturated model and the independence model, which indicates that the hypothesized models are the most stable in the population (Schumacher and Lomax, 2010). Additionally, Bootstrap ML (maximum likelihood) is performed in a number of 1000 bootstrap samples with 95 percentile confidence interval. Selected AMOS output of the bootstrap estimates, standard error, mean bias, and confidence interval (p) are presented in Table 4.44.

Table 4-44: Amos output comparing different models values of EVCI, BIC, and AIC related to the two models that investigates the effect of QMPs on above/under revenue per room.

	Above average revenue per room (competitive advantage)			under revenue per room		
Models	**ECVI**	**BIC**	**AIC**	**ECVI**	**BIC**	**AIC**
Default (hypothesized) model	**3.355**	**528.725**	**358.024**	**2.192**	**585.802**	**385.704**
Saturated model (just identified model)	**5.018**	**1299.830**	**552.000**	**3.136**	**1428.617**	**552.000**
Independence model (null model, all correlations equal zero)	**20.660**	**2334.978**	**2277.658**	**23.451**	**4200.432**	**4127.381**

There are no large differences between the original data parameter estimates, standard error, and P values presented in Tables 4.39, 4.42 and the bootstrap estimates and standard error presented in Table 4.45, that is, the difference are very small. Additionally, the information provided in the *Bias* column in Table 4.45 represents the difference between the bootstrap mean estimate and the original sample estimate which is very small. Therefore, the results can be interpreted as being stable estimates of the whole population.

Table 4-45: Amos output: Bootstrap estimates, standard error, bias and confidence intervals (p) values related to the tow models that investigates the effect of QMPS on above/under revenue per room.

	Above average revenue per room				Under average revenue per room			
	Estimates	**S.E.**	**Bias**	***P***	**Estimates**	**S.E.**	**Bias**	***P***
X3 ◄--- TML	**.923**	**.029**	**.000**	**.002**	**.853**	**.030**	**-.001**	**.002**
X2 ◄---- TML	**.913**	**.023**	**.000**	**.002**	**.900**	**.023**	**-.002**	**.002**
X1 ◄---- TML	**.836**	**.041**	**.002**	**.002**	**.863**	**.026**	**.000**	**.002**
X8 ◄------ EM	**.766**	**.057**	**-.003**	**.002**	**.890**	**.021**	**-.001**	**.002**
X7 ◄------ EM	**.800**	**.055**	**-.003**	**.002**	**.833**	**.032**	**-.001**	**.002**
X6 ◄------ EM	**.850**	**.040**	**-.001**	**.002**	**.835**	**.032**	**-.003**	**.002**
X5 ◄------ EM	**.797**	**.051**	**.000**	**.002**	**.873**	**.025**	**-.002**	**.002**
X4 ◄------ EM	**.867**	**.037**	**-.001**	**.002**	**.820**	**.033**	**-.003**	**.002**
X13◄---- CF	**.892**	**.028**	**.000**	**.002**	**.871**	**.031**	**-.002**	**.002**
X12 ◄---- CF	**.872**	**.029**	**.000**	**.002**	**.870**	**.023**	**.001**	**.002**
X11 ◄---- CF	**.912**	**.021**	**-.001**	**.002**	**.879**	**.024**	**.000**	**.002**
X10 ◄---- CF	**.868**	**.034**	**-.001**	**.002**	**.888**	**.020**	**-.001**	**.002**
X9 ◄---- CF	**.826**	**.038**	**.002**	**.002**	**.896**	**.028**	**-.002**	**.002**
X16 ◄---- SM	**.958**	**.042**	**-.003**	**.002**	**.944**	**.014**	**-.001**	**.002**
X15 ◄---- SM	**.885**	**.058**	**.005**	**.002**	**.896**	**.025**	**.001**	**.002**
X14 ◄--- SM	**.595**	**.121**	**.003**	**.002**	**.853**	**.030**	**-.001**	**.002**

X19 ◄- - QD&R	.935	.031	.000	.002	.948	.015	.000	.002
X18 ◄- - - QD&R	.860	.038	.000	.002	.938	.016	.001	.002
X17 ◄- - QD&R	.782	.097	.007	.002	.924	.018	.000	.002
X22 ◄- - - - PM	.927	.02	-.001	.002	.896	.022	-.001	.002
X21 ◄- - - - - PM	.902	.023	.000	.002	.918	.018	.000	.002
X20 ◄- - - - PM	.970	.013	.000	.002	.876	.023	-.001	.002
REV/ROOM <---- TML	.364	.102	.015	.002	.013	.128	.002	.192
REV/ROOM <---- EM	.120	.113	.000	.307	.263	.126	.004	.026
REV/ROOM <---- CF	.275	.104	.003	.012	.401	.086	.003	.002
REV/ROOM <---- SM	.291	.095	.001	.006	-.070	.111	.002	.515
REV/ROOM <---- PM	-.237	.106	.000	.044	.198	.166	-.009	.242
REV/ROOM <---- QD&R	-.191	.122	.002	.104	-.122	.106	-.003	.240
CF ←-- TML	.358	.095	-.005	.002	.322	.105	.000	.003
EM ←-- TML	.128	.144	-.002	.338	.584	.076	-.004	.002
SM ←-- TML	.201	.149	-.009	.131	.292	.096	-.002	.004
QD&R ←-- TML	.295	.125	-.005	.026	.282	.132	.006	.026
PM ←-- TML	.294	.101	-.003	.012	.311	.083	-.001	.002
CF <---- EM	-.015	.097	.002	.910	.343	.102	-.009	.004
PM <---- EM	.039	.106	.001	.655	.177	.081	.009	.020
PM <---- SM	.457	.124	.006	.002	.451	.089	-.006	.002
EM <---- QD&R	.190	.150	-.002	.210	.161	.081	.008	.031
CF <---- QD&R	.303	.090	.005	.003	.170	.095	.008	.053
SM <---- QD&R	.162	.307	-.009	.211	.458	.095	.002	.002
QD&R <---- PM	.189	.200	.006	.214	.374	.149	-.009	.026

4.5 Summary

This chapter presents the results of the preliminary analysis (including the conditions necessary to conduct the multivariate analysis techniques employed in the current study), descriptive analysis, exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and structural equation modelling (SEM). Preliminary analysis shows that all necessary conditions to run EFA, CFA, and SEM, i.e. conditions regarding the sample size, missing data, outliers, normality, and multicollinerity, are met. EFA results set reliable structures for quality management dimensions. CFA contributes to literature not only with reliable and valid measures of QM but also by confirming the multidimensional nature of the quality management construct. In addition, SEM investigated the causal direct and indirect impact of quality management on financial performance and the impact of quality management on competitive advantage.

The results of SEM give evidence that four out of six QM have positive direct impact on financial performance as follows: top management leadership (path coefficient=0.33, P <0.001); employee management (path coefficient=0.29, P <0.001); customer focus (path coefficient=0.17, P <.01); and supplier management (path coefficient=0.12, P <0.1). While, two out of six QM do not have direct positive impact on financial performance as follows: quality data & reporting (path coefficient=0.08, P=0.06); and process management (path coefficient= -0.17, P =0.08). Additionally, the results of multi-group analysis in SEM give evidence that four out of six QM have positive direct impact on above average employee productivity (as indicator of CA) as follows: top management leadership (path coefficient=0.43, P <0.001); employee management (path coefficient=0.22, P <0.05); customer focus (path coefficient=0.21, P <0.05); and supplier management (path coefficient=0.25, P <0.05). Similarly, four out of six QM have positive direct impact on above average revenue per room (as indicator of CA) as follows: top management leadership (path coefficient=0.36, P <0.001); employee management (path coefficient=0.12, P <0.1); customer focus (path coefficient=0.28, P <0.01); and supplier management (path coefficient=0.29, P <0.01). While two out of six QM do not have positive direct impact on above average employee productivity (as indicator of CA) as follows: quality data & reporting (path coefficient= - 0.05, P =0.61); and PM (path coefficient= - 0.26, P <0.05). Similarly, two out of six QM do not have positive direct impact on above average revenue per room (as indicator of CA) as follows: quality data & reporting (path coefficient= - 0.19, P =0.06); and process management (path coefficient= - 0.24, P <0.05). On the other hand the results of multi group analysis in SEM give evidence that three out of six QM have positive direct impact on under average employee productivity as follows: employee management (path coefficient=0.16, P <0.1); customer focus (path coefficient=0.38, P <0.001); and PM (path coefficient=0.28, P <0.05). Similarly, two out of six QM have direct positive impact on under average revenue per room as follows: employee management (path coefficient=0.26, P <0.01); and customer focus (path coefficient=0.40, P <0.001). While, the results of SEM shows that there is no evidence of the positive impact of three QM on under average employee productivity as follows: top management leadership (path coefficient=0.10, P=0.33); SM (path coefficient= -0.09, P =0.42); and quality data & reporting (path coefficient= -0.11, P =0.21). Similarly, SEM results shows that there is no evidence that four out of six QM have positive direct impact on under average revenue per room as follows : top management leadership (path coefficient=0.01, P = 0.19); supplier management (path coefficient= -0.07, P =0.51); process management (path coefficient= -0.12, P =0.12); and quality data & reporting (path coefficient= 0.20, P =0.23).

Chapter 5: Interpretation of Study Findings

5.1 Introduction

This chapter interprets the research findings from the survey questionnaires (Appendix 8) in order to compare the current study findings (similarities and differences) in the light of the previous work in this field. The current study results are in a format related to two main objectives of the research. Firstly, this study discovers factors (dimensions) that constitute quality management through two main analytical techniques: exploratory factor analysis and confirmatory factor analysis. Secondly, it investigates the impact of quality management on financial performance followed by the impact of quality management on competitive advantage.

5.2 Discussion of findings

In analysing the current study data to achieve the first research objective (identifying the dimensional structure of quality management), it was necessary to deconstruct the objective into two parts. The first part of the objective relates to identifying the valid and reliable factors (dimensions) of quality management that were employed in previous studies (this was done in the literature review chapter), while the second part of the objectives relates to practically analysing these dimensions to find out if they can be employed in the current study as uni-dimensional or multi-dimensional construct.

Prior to testing the dimensional structure of quality management, descriptive statistics and tests for reliability and validity are completed and indicate that the responses used in this study met the levels of reliability and validity required. Additionally, no missing data or outliers are found to violate the results of the current study. Inter-item correlation and Cronbach alpha scores were used to estimate the reliability of the identified scales and confirm that the scales employed were internally consistent. The six employed quality management practices Cronbach's Alpha are as follows: TML (0.95), EM (0.95), CF (0.96), SM (0.91), QD&R (0.95), and PM (0.95). Additionally, all the six employed quality management practices are found to have evidence of convergent and discriminant validity (as illustrated later in this section).

The empirical analysis of the dimensional structure of quality management went through two stages; in the first stage exploratory factor analysis is employed and then confirmed by confirmatory factor analysis in the second stage. The results of both techniques (EFA and CFA) provide evidence that QM is a multidimensional construct with six dimensions: top management leadership, employee management customer focus, supplier management, process management and quality data and reporting. This finding contradict other empirical studies that employed QM as a unidiemnsional construct because while, some authors such as Easton and Jarrell (1998), Kaynak and Hartley (2005), and Terziovski (2006) assume that quality management QM is a uni-dimensional construct without giving any statistical evidence, other authors such as Saraph et al. (1989), Flynn et al. (1994), Douglas and Judge (2001), De Cerio (2003), Conca et al. (2004), Prajogo and Sohal (2006), Mady (2008), Su et al. (2008), and Zu (2008), conducted either EFA or CFA for each single dimension of QM to test its uni-dimensionality; however, the dimensional structure of QM itself was statistically untested.

On the other hand, this finding (QM is a multidimensional construct) is consistent with previous studies that assumed the multidimensional structure of quality management and tested it by using exploratory factor analysis such as those studies conducted by Grandzol and Gershon (1997), Dow et al. (1999), Kaynak (2003), Sila and Ebrahimpour (2005), Lakhal et al. (2006), and Zu et al. (2008). However variables in EFA might be correlated for several reasons, besides being measures of the same factor (Rubio et al., 2001) (for more details see Section 3.5.2.1.2). This leads Hunter and Gerbing (182:273) to argue that EFA is a poor ending point for testing the dimensional structure of the scale. Therefore, confirmatory factor analysis is employed in the current study to test the dimensional structure of quality management, in which three models are developed; (1) oblique factor model, (2) higher order factor model, and (3) one factor model (for more details see Section 3.5.2.1.2). Without testing these three models, the researcher cannot assume that the significant correlation is a result of factors measuring the same construct (Rubio et al., 2001). The results of the goodness of model fit for the structure models of these three models indicate that the oblique factor model is the model that fits the data best of the three models, which give evidence that quality management is a multidimensional construct. This means that the predetermined factors of quality management (TML, EM, CF, SM, QD&R, and PM) are different dimensions of quality management. Following this analysis, the best fitting- model, the oblique factor model, is subjected to testing of constructs for convergent and discriminant validity. All the six employed quality management practices are found to have evidence of convergent and discriminant validity, which indicate that indicators of each construct share a high proportion of variance in common (convergent validity) and each construct is truly distinct from other constructs both in terms of how much it correlates with other constructs and how distinctly measured variables represent only this single construct (discriminant validity). This result is consistent with previous studies conducted by Kaynak (2003), Kaynak and Hartley (2005), Lakhal, et al. (2006), Tari et al. (2007), Su et al. (2008), and Zu et al. (2008). Several methods were employed in these studies to test the measurement with regard to convergent validity such as if items coefficient is greater than two times of its standard error, there is evidence of convergent validity (Kaynak, 2003), if items are highly correlated to its pre-assumed factor, there is evidence of convergent validity (Tari et al., 2007; Su et al., 2008; and Zu et al., 2008). However, the previous methods do not offer strong evidence of convergent validity (Hair et al., 2006). In this study, convergent validity is assessed following the recommendation of Hair et al. (2006) who suggested three criteria through confirmatory factor analysis (CFA). First, factor loadings should be greater than 0.5 or higher and ideally 0.7 or higher; second, composite reliability should be above 0.7 and ideally 0.8 or higher. Third, average variance extracted (AVE) should to be above the cut-off-value of 0.5 or greater to suggest adequate convergent validity (foe more details see Section 3.5.2.1.2). Similarly, discriminant validity was assessed in previous studies such as those conducted by Lakhal et al. (2006); and Kaynak and Hartley (2005) by paired construct test where if the unconstrained model of any two pair of factors yields a chi-square value that is lower (at least 3.84) than the constrained model, then a two factor model indicates a better data fit, and discriminant validity is supported. However, in practice this method does not offer strong evidence of discriminant validity, because strong correlations, sometimes as high as 0.9, can still create significant difference in fit between the two models (hair et al., 2006). As a result, in this study a more rigorous test is conducted as suggested by Fonell and Larcker (1981), and Hair et al. (2006) by comparing the average variance-extracted (AVE) value for any two construct with the square of the correlation estimates between the same two constructs. The variance extracted estimates are greater than the squared correlation estimates which provide evidence of discriminant validity (see Section 4.4.2.2.2).

To date and to the researcher's knowledge, this is the first study that investigated the dimensional structure of quality management by using EFA and test it further by CFA, testing the goodness of fit indexes of the previously mentioned three models in AMOS. This is a significant contribution, given the large discrepancy in the literature over the content and the number of the quality management dimensions. In other words, this result can help researchers in identifying the dimensional structure of quality management and contributes to resolve contradiction and lack of clarity about this issue.

The second objective is concerned with investigating the impact of quality management on competitive advantage (above average financial performance). However the impact of quality management on financial performance is discussed first, as it has received much attention in the literature (see Appendix 5).

5.2.1 Impact of Quality Management on Financial Performance

In this model (quality management impact on hotel financial performance) empirical evidence indicates that quality management practices have a positive impact on hotel financial performance. More specific, the results highlight the crucial role of top management leadership, employee management, customer focus, and supplier management in improving hotel financial performance. Additionally, the empirical analysis shows that the six quality management practices (top management leadership, employee management customer focus, supplier management, process management and quality data and reporting) are significantly and positively interrelated with each other. Moreover, some (not all) of them (TML, EM, CF, SM) have positive and direct impact on financial performance. This result is consistent with prior expectations (see Section 2.3). Hotels that implement one quality management practice, such as top management leadership, are likely to adopt other practices, such as customer focus or employee management. However, this result indicates that several proponents of quality management have been effective in convincing managers to implement the entire package of quality management practices; it does not necessarily mean that those practices must be implemented together to be successful (illustrated later in this section). In other words, these results are consistent with Powell (1995), Dow et al. (1999) and Sila and Ebrahimpour (2005) and provide strong evidence against the interdependence assumption of quality management (where no direct relationship between quality management and organization performance can be established but one practice should affect the other to improve the organization performance), which was concluded by several authors such as Flynn et al. (1995), Hendrcks and Singhal (1997), Easton and Jarell (1998), Kaynak (2003), Zu et al. (2008), Su et al. (2008) and Zu et al.(2009). Specifically, top management leadership has a statistically significant direct impact on financial performance. The results of SEM find a positive path coefficient between the two constructs (TML and FP) that has a standardized parameter estimate of 0.33 with significant P value <0.001. This significant and positive impact of top management leadership on financial performance implies that hotel financial performance increases when the hotel top management leadership translates quality policy into measurable objectives and requirements, and lays down a sequence of steps for realizing them within a specified timeframe, along with evaluating the hotel results by comparing them to planned results, as well as providing the necessary financial resources to implement the quality management related practices (EM, CF, SM, QD&R, and PM). These conclusions corroborate previous studies by Powell (1995), Dow et al. (1999), Samson and Terziovski (1999), Rahman and Bullock (2005), Lakha et al. (2006), and Fening et al. (2008) as indicated in Table 5.1, despite the methodological and context differences between these studies and current study (see Table 5.1), one explanation of the similar results is due to employing similar dimensions to measure quality management construct.

On the contrary, this result (positive direct impact of TML on financial performance) contradicts other previous empirical studies results such as those conducted by Flynn et al. (1995), Kaynak (2003), Su et al. (2008), and Zu et al. (2008). This contradiction is due to not only the differences in the methods, context, or data analysis technique employed (see Appendix 5), but also due to the approach that was adopted in these studies to investigate the relationship between QM and its outcome. Quality management practices were categorized in these studies in a way that does not allow any direct relationship between TML and performance. More specific, TML in these studies is considered one of the infrastructure quality management practices which should first improve some other core quality management practices (i.e. process management, and quality data and reporting) before improving the organization performance.

Equally important, TML is found to have direct positive and significant impact on all the other quality management practices in the model. The results of the SEM show positive standardized parameter estimates and significant P value for the impact of TML on other constructs as follows: CF (path coefficient=0.41, $P < 0.001$); EM (path coefficient=0.52, $P < 0.001$); SM (path coefficient=0.31, $P < 0.001$); QD&R (path coefficient=0.42, $P < .001$); and PM (path coefficient=0.38, $P < 0.001$). The indirect impact of top management leadership on hotel financial performance through RM, CF, SM, QD&R, and SM increases the standardised coefficient between the two constructs (TML and FP) from 0.33 to 0.65 (approximately double). This suggest that top management leadership acts as a driver of implementing the other quality management practices by creating goals, policies, values and systems to fulfil the customer and other stakeholders' requirements and consequently improve the organization performance. The result of SEM give evidence that TML have positive significant impact on financial performance, but its impact on achieving competitive advantage (above average financial performance) is explored in the next models and discussed in Section 5.2.2.

Moreover, the results of this model clarify the significant positive direct impact of employee management on hotel financial performance. The results of the SEM indicate a positive standardized parameter estimate (0.39) and significant impact ($P < 0.01$) of

EM on financial performance. This result is consistent with the results of previous studies conducted by Powell (1995), Dow et al. (1999), Samson and Terziovski (1999), De Cerio (2003), Lakhal et al. (2006), Tarı´et al. (2007), Fening et al. (2008), and Zehir and Sadikoglu (2010) (see Table 5.1). Once again, Despite the methodological and context differences between these studies and current study (see Table 5.1), the similar results may be due to employing similar dimensions to measure quality management construct.

On the other hand, this finding (positive direct impact of EM on financial performance) is inconsistence with findings of other previous studies. This contradiction may be because either some of these studies investigated EM in a way that did not allow a direct relationship between EM and financial performance such as those study by Flynn et al. (1995); Kaynak (2003); Su et al. (2008); and Zu et al. (2008), or due to the difference in the study context. For example Sila and Ebrahimpour (2005) did their study in 220 USA manufacturing firm, while the result of current study are based on investigating 288 Egyptian hotel (see Table 5.1).

These findings (positive direct impact of EM on financial performance) notably show that the hotel financial performance improves when all the hotel departments are involved in the quality management related activities and when managers create a work environment that encourages employee to perform to the best of their abilities, besides the availability of training in basic statistical techniques (such as histogram and control charts) for the hotel staff, along with arranging monthly meetings for employee from different departments to discuss the quality related suggestions and implement the best suggestions to be more proactive in finding solutions for problems as they arise. Additionally, the SEM results provide evidence that EM have positive impact on all the other quality management practices of this model, as the results of SEM found positive and significant impact of EM on CF (path coefficient=0.20, $P < 0.01$) and PM (path coefficient=0.15, $P < 0.05$). However, these direct impacts (EM on CF and PM) do not significantly increase the direct impact of EM on hotel financial performance (from 0.29 to 0.31). Despite the positive significant impact of EM on financial performance, its impact on achieving competitive advantage (above average financial performance) is explored in the next models and discussed in Section 5.2.2.

In addition, the results clarify the direct and significant effect of customer focus on improving hotel financial performance. The SEM standardized parameter estimates for the impact of CF on FP was positive (0.17) and significant ($P < 0.05$). This finding is in line with the studies of Dow et al. (1999), Samson and Terziovski (1999), Chonga and Rundus (2004), Rahman and Bullock (2005), Lakhal et al. (2006), Fening et al., (2008) and Zehir and Sadikoglu (2010) (see Table 5.1). This conclusion is not surprising as customer focus is the second (just next to TML) most frequently employed practices to measure quality management in the literature (see Appendix 6), given the common wisdom (based on the previous empirical evidence) that fulfilling customer requirements is the main goal of all types of organizations, to increase profitability.

Specifically, hotel financial performance will increase when the hotel is in contact with customers to keep up-to-date about their requirements, which should be considered in the product design process to produce new products that satisfy their requirements. This should be combined with resolving any complaints derived from the customer satisfaction survey in a timely manner (Rahman and Bullock, 2005; Dow et al., 1999; Zehir and Sadikoglu, 2010). The results give evidence that CF have positive significant impact on financial performance, but its impact on achieving competitive advantage (above average financial performance) is explored in the next models and discussed in Section 5.2.2.

Furthermore, this model show that supplier management has a positive (path coefficient=.12) significant[8] ($p \leq 0.1$) impact on hotel financial performance. This result is consistence with previous studies, such as those by Rahman and Bullock (2005), and Kaynak and Hartley (2008) (see Table 5.1). This finding reflects that quality of the supplied materials form long-term contracts with trusted supplier, to an extent,

[8] This Weak significant value ($p \leq .1$) was employed in four star journal as an accepted probability value see those studies by Samson and Terziovski (1999); Ahire and Dreyfus (2000); Kaynak(2003); Zu et al.,(2008)

Table 5-1: location of the current study findings on the impact of QM on FP in relation to the previous studies findings

The relationship between quality management and financial performance				
positive impact of QMPs on FP	**Current study findings of SEM**	**Supporting findings from Previous Studies**		**Responses and Methods**
TML - - - -► FP	Supported (path coefficient=0.33, P <0.001)	1) Powell (1995)	supported $r = 0.41$, $p < 0.001$	54 USA manufacturing and service firms (Correlation analysis)
		2) Dow et al. (1999)	supported (path coefficient 0.18, $p < 0.01$)	698 manufacturing firms (Structural equation modelling)
		3) Samson and Terziovski (1999)	supported Beta coefficient (β) = 0.15, $p < 0.001$	1024 Australian and New Zealand manufacturing firms (Multiple regression)
		4) Rahman and Bullock (2005)	supported Beta coefficient (β)= 0.35, $p < 0.001$	261 Australian manufacturing firms (Simple regression analysis)
		5) Sila and Ebrahimpour (2005)	supported (path coefficient 0.288, p <0.05)	220 USA manufacturing firms Structural equation modeling
		6 Fening et al. (2008)	supported Beta coefficient (β)= 0.46, p < 0.001	200 firms in Ghana Multiple regression
EM - - - -► FP	Supported (path coefficient= 0.39, P <0.01)	1) Lakhal et al. (2006)	supported (path coefficient 0.82 $p < 0.01$)	133 Tunisian manufacturing Firms path analysis by lisrel
		1) De Cerio (2003)	supported Beta coefficient (β) = 0.164, $p < 0.05$	965 Spanish industrial plants Multiple regression
		3) Dow et al. (1999)	supported (path coefficient 0.23, $p < 0.01$)	698 manufacturing firms Structural equation modeling
		4) Tarı´et al. (2007)	supported (path coefficient 0.46, $p < 0.01$)	106 firms in Spain path analysis by EQS
		5) Fening et al. (2008)	supported Beta coefficient (β)= 0.51, p < 0.001	200 firms in Ghana Multiple regression
		6) Powell (1995)	supported $r = 0.61$, $p < 0.001$	54 USA manufacturing and service firms (Correlation analysis)

		7 Zehir and Sadikoglu (2010)	supported Beta coefficient (β)= 0.12, $p < 0.05$	373 firms Multiple regression
		Samson and Terziovski (1999)	supported Beta coefficient (β)= 0.25, $p < 0.001$	1024 Australian and New Zealand manufacturing firms Multiple regression
CF - - - -▸ FP	Supported (path coefficient=0.17, $P < 0.05$)	1) Rahman and Bullock (2005)	supported Beta coefficient (β)=0 .25, $p < 0.01$	261 Australian manufacturing firms Simple regression analysis
		2) Dow et al. (1999)	supported (path coefficient 0.247, $p < 0.01$)	698 manufacturing firms Structural equation modeling
		3) Lakhal et al. (2006)	supported path coefficient 0.20, $p < 0.001$	133 Tunisian manufacturing Firms path analysis by lisrel
		4) Samson and Terziovski (1999)	supported Beta coefficient (β) = 0.12, $p < 0.01$	1024 Australian and New Zealand manufacturing firms Multiple regression
		5) Chonga and Rundus (2004)	supported Beta coefficient (β) = 0.30, $p < 0.001$	220 large Australian manufacturing firms multiple regression analysis
		6) Fening et al. (2008)	supported Beta coefficient (β)= 0.31, $p < 0.001$	200 firms in Ghana Multiple regression
		7) Zehir and Sadikoglu (2010)	supported Beta coefficient (β)= 0.13, $p < 0.01$	373 firms Multiple regression
SM - - - -▸ FP	Supported (path coefficient=0.12, $P<0.1$)	1) Dow et al. (1999)	rejected (path coefficient 0.063, p = insignificant)	698 manufacturing firms Structural equation modeling
		2) Sila and Ebrahimpour (2005)	rejected	220 USA manufacturing firms Structural equation modeling
		3) Powell (1995)	rejected	54 USA manufacturing and service firms Correlation analysis

		4) Kaynak and Hartley (2008)	supported (path coefficient 0.56, $p < 0.01$)	424 USA firms SEM by LISREL
		5) Rahman and Bullock (2005)	supported Beta coefficient (β)= 0.15, $p < 0.05$	261 Australian manufacturing firms Simple regression analysis
QD&R - - -▶ FP	rejected (path coefficient =-0.17, P= 0.03)	1) Sila and Ebrahimpour (2005)	rejected	220 USA manufacturing firms Structural equation modeling
		2) Samson and Terziovski (1999)	rejected Beta coefficient (β) = -.14, $p < .001$	1024 Australian and New Zealand manufacturing firms Multiple regression
PM - - - -▶ FP	rejected (path coefficient= 0.08, P= 0.23)	1) Samson and Terziovski (1999)	rejected Beta coefficient (β) = -0.02, p =0.423	1024 Australian and New Zealand manufacturing firms Multiple regression
		2) Powell (1995)	rejected r = 0.21, p = insignificant	54 USA manufacturing and service firms Correlation analysis
		3) Zehir and Sadikoglu (2010)	rejected Beta coefficient (β)= -0.025, p =0.61	373 firms Multiple regression
TM - - - -▶ EM	Supported (path coefficient=0.52, P <0.001)	1) Tari et al. (2007)	supported path coefficient 0.41, $p < 0.001$	965 Spanish industrial plants Multiple regression
		2) Sila and Ebrahimpour (2005)	supported path coefficient 0.26, $p < 0.001$	220 USA manufacturing firms Structural equation modeling
		3) Kaynak (2003)	supported path coefficient 0.66, $p < 0.01$	214 USA manufacturing and service firms Structural equation model
		4) Kaynak and Hartley (2008)	supported (path coefficient 0.29, $p < 0.01$)	424 USA firms SEM by LISREL
		5) Singh (2008)	supported (path coefficient 0.88, $p < 0.01$)	1053 Australian plants SEM

		6) Zu (2008)	supported (path coefficient 0.62, $p < 0.01$)	226 US manufacturing firms SEM (AMOS)
		7) Lakhal et al. (2006)	supported (path coefficient 0.74, $p < 0.01$)	133 Tunisian manufacturing Firms path analysis by lisrel
		8) Flynn et al. (1995)	supported Beta coefficient (β)= 0.38, $p < 0.05$	42 USA manufacturing firms multiple regression analysis
TML ----▶ CF	Supported (path coefficient=0.41, P <0.001)	1) Tari et al., 2007	supported path coefficient 0.25, $p < 0.001$	965 Spanish industrial plants Multiple regression
		2) Lakhal et al. (2006)	supported (path coefficient 0.31, $p < .01$)	133 Tunisian manufacturing Firms path analysis by lisrel
		3) Kaynak and Hartley (2008)	supported (path coefficient 0.14, $p < 0.01$)	424 USA firms SEM by LISREL
		4) Zu (2008)	supported (path coefficient 0.60, $p < 0.01$)	226 US manufacturing firms SEM (AMOS)
		5) Singh (2008)	supported (path coefficient 0.90, $p < 0.01$)	1053 Australian plants SEM
TML----▶ SM	Supported (path coefficient=0.31, P <0.001)	1) Kaynak and Hartley (2008)	supported (path coefficient 0.23, $p < .01$)	424 USA firms SEM by LISREL
		2) Kaynak (2003)	supported path coefficient 0.31, $p < 0.01$	214 USA manufacturing and service firms Structural equation model
		3) Sila and Ebrahimpour (2005)	supported path coefficient 0.26, $p < 0.01$	220 USA manufacturing firms Structural equation modelling
		4) Singh (2008)	supported (path coefficient 0.85, $p < 0.01$)	1053 Australian plants SEM(AMOS)
		5) Zu (2008)	supported (path coefficient 0.51, $p < 0.01$)	226 US manufacturing firms SEM (AMOS)

TML --→ QD&R	Supported (path coefficient=0.42, *P* <0.001)	1) Ahire et al. (1996)	supported path coefficient 0.54, $p < 0.01$	371 PLANTS LISREL
		2) Sila and Ebrahimpour (2005)	supported path coefficient 0.76, $p < .001$	220 USA manufacturing firms Structural equation modelling
TML ----→ PM	Supported (path coefficient=0.38, *P* <0.001)	1) Ahire et al. (1996)	supported Path coefficient 0. 48, $p < 0.01$	371 PLANTS LISREL
EM ---→ CF	Supported (path coefficient=0.20, *P* <0.01)	1) Kaynak and Hartley (2008)	supported (path coefficient 0.44, $p < 0.05$)	424 USA firms SEM by LISREL
		2) Ahire et al. (1996)	supported path coefficient 0.59, $p < .01$	371 PLANTS LISREL
EM ---→ PM	Supported (path coefficient=0.15, *P* <0.05)	1) Sila and Ebrahimpour (2005)	supported path coefficient 0.75, $p < 0.001$	220 USA manufacturing firms Structural equation modelling
		2) Tari et al. (2007)	supported path coefficient 0.31, $p < 0.001$	965 Spanish industrial plants Multiple regression
		3) Zu (2008)	supported (path coefficient 0.36, $p < 0.05$)	226 US manufacturing firms SEM (AMOS)
SM ---→ PM	Supported (path coefficient=0.44, *P* <0.001)	1) Kaynak and Hartley (2008)	supported (path coefficient 0.41, $p < .01$)	424 USA firms SEM by LISREL
		2) Tari et al. (2007)	supported path coefficient 0.32, $p < 0.001$	965 Spanish industrial plants Multiple regression
		3) Kaynak (2003)	supported path coefficient 0.27, $p < 0.01$	214 USA manufacturing and service firms Structural equation model
		4) Zu (2008)	supported (path coefficient 0.16, $p < 0.05$)	226 US manufacturing firms SEM (AMOS)

QD&R - - -> EM	Supported (path coefficient=0. 27, *P* <0.001)	1) Sila and Ebrahimpour (2005)	supported path coefficient 0.70, $p < 0.001$	220 USA manufacturing firms Structural equation modeling
		2) Sila and Ebrahimpour (2005)	supported path coefficient 0.70, $p < 0.001$	220 USA manufacturing firms Structural equation modeling
		3) Kaynak (2003)	supported path coefficient 0.31, $p < 0.01$	214 USA manufacturing and service firms Structural equation model
		4) Kaynak and Hartley (2008)	supported (path coefficient 0.29, p <0.01)	424 USA firms SEM by LISREL
QD&R - - -> CF	Supported (path coefficient=0. 24, *P* <0.001)	1) Sila and Ebrahimpour (2005)	supported path coefficient 0.66, p < .001	220 USA manufacturing firms Structural equation modeling
		2) Ahire et al. (1996)	supported path coefficient 0.66, $p < 0.01$	371 PLANTS LISREL
QD&R - - -> SM	Supported (path coefficient=0. 40, *P* <0.001)	1) Sila and Ebrahimpour (2005)	supported path coefficient 0.70, $p < 0.001$	220 USA manufacturing firms Structural equation modeling
		2) Kaynak (2003)	supported path coefficient 0.23, $p < 0.01$	214 USA manufacturing and service firms Structural equation model
		3) Kaynak and Hartley (2008)	supported (path coefficient 0.31, p < .01)	424 USA firms (SEM by LISREL)
		4) Zu (2008)	supported (path coefficient 0.17, $p < 0.05$)	226 US manufacturing firms SEM (AMOS)
PM - - - -> QD&R	Supported (path coefficient=0.28, *P* <0.001)	1) Forza and Flippini (1998)	supported path coefficient 0.77, $p < 0.01$	43 plants SEM LISREL

determines the final product quality. Moreover, supplier capabilities to react to the firm (hotel) need, in turn, can determine the firm (hotel) flexibility in responding to customer requirements that should be met to improve financial performance (Ahire and O'Shaughnesy, 1998; Rao et al., 1999; Conca et al., 2004; and Rahman and Bullock, 2005). However, other studies' findings did not support the positive impact of SM on performance, such as those by Dow et al. (1999), Powell (1995), and Sila and Ebrahimpour (2005). This contradiction may be due to the differences in the study context between these studies and the current study. For example, Dow et al. (1999) did their study in 698 USA manufacturing firm; Powell (1995) did his study in 54 USA manufacturing firm; and Sila and Ebrahimpour (2005) did their study in 220 USA manufacturing firm, while the results of the current study are based on investigating 288 hotel in Egypt. Additionally, the results provide evidence that supplier management have positive and significant impact on process management, because improving the quality of purchased materials and parts, a main source of process inconsistency, will have a positive influence on process management by eliminating variance in materials and parts, which makes it possible to utilize internal controls to reduce rework and waste (Flynn et al., 1995; and Tari et al., 2007). Although, these findings are about the nature of the impact of SM on financial performance, its impact on achieving competitive advantage (above average financial performance) is explored in the next models and discussed in Section 5.2.2.

Conversely, the results of this model raise serious doubts as to the useful role of two quality management practices: process management and quality data and reporting in improving firm financial performance. Specifically, the results show an evidence that quality data and reporting (availability and use of quality data such as defects; errors rates; and control charts) do not have significant impact on hotel financial performance (path coefficient= 0.08, P= 0.23), while process management (availability of standardized instruction; use of statistical process control techniques to evaluate processes; availability of statistical techniques to reduce variance in processes; use of preventive maintenance system) have a negative impact on hotel financial performance (path coefficient = - 0.17, P= 0.03). These results are consistent with previous studies such as those by Powell (1995), Samson and Terziovski (1999), Sila and Ebrahimpour (2005), and Zehir and Sadikoglu (2010) (see Table 5.1) and contradicts other studies such as those by Flynn et al. (1995), Zu et al. (2008), and Zu et al. (2009). The reason of this contradiction is because (as previously discussed) these studies employed these two QMPs (QD&R and PM) to completely mediate the relationship between the other QM practices (i.e. TML, CF, EM, and SM) and organization performance.

It is important to note that from these results, we cannot suggest that for a single hotel, quality data and reporting should not be the focus of improvement because they are not related to financial performance, nor that process management in a company leads to worse performance, but it can be said that these two weaker factors did not powerfully improve the firm financial performance directly but are necessary to keep the business of the hotel running (Samson and Terziovski, 1999). However managers may be wrongly implementing these two quality management practices (PM, and QD&R) in conjunction with truly beneficial QMPs (TML, EM, CF, and SP respectively) because they are unable to discover which QMPs really improve the firm financial performance. Therefore, managers need to be cautious about adopting them (Dale, 2003)

Furthermore, the SEM results provide evidence that these two quality management practices (QD&R and PM) have positive significant impact on the other quality management practices (EM, CF, and SM) in the model. This support the assumption that not just the availability of quality information but the analysis of this quality information can be employed to evaluate and enhance the employee performance, to sustain a customer focus and to identify and correct quality problems instantly which in return will reduces reworks and waste and consequently improve productivity and profitability (see Section 2.4). Despite the non-supporting impact of these two quality management practices (QD&R and PM) on hotel financial performance, but their impact on competitive advantage will be discovered in the next models discussed in Section 5.2.2.

It is worth mentioning here that QP (quality performance) is held as an unmeasured concept in the current study that intervenes in the relationship between quality management and financial performance but its effect can be theoretically inferred from the effect of quality management on financial performance (see Section 2.4).

In summary, the results of this study provide strong evidence that certain quality management practices (TML, EM, CF, and SM) when implemented can directly improve hotel financial performance, while other quality management practices (PM, and QD&R) are necessary to keep the business of the hotel running but are not sufficient to positively increase the hotel financial performance (Samson and Terziovski, 1999). These results provide strong evidence against the interdependence assumption of quality management (where no direct relationship between quality management and organization performance can be established but one practice should affect the other to improve the organization performance), supported by several authors such as Flynn et al. (1995), Hendrcks and Singhal (1997), Easton and Jarell (1998), Kaynak (2003), Zu et al. (2008), Su et al. (2008) and Zu et al. (2009).

After testing the model hypotheses, two techniques in SEM are used for model validation: (1) comparing the values of expected cross-validation index (ECVI), Bayesian information criterion (BIC), and Akaike information criterion (AIC) of the hypothesised model to the same the same values in the saturated model and the independence model, (2) bootstrap technique which uses the original data to reproduce multiple subsamples and create bootstrap estimates and standard errors (Byrne, 2010) (for more details, see Section 4.4.3.1). The results of model validation indicate that the current study results can be interpreted as being stable estimate of the whole population. To date and to the researcher's knowledge, this is the first study that employed these techniques to validate the results obtained.

5.2.2 Impact of Quality Management on Competitive Advantage

To identify which quality management practices give the hotels a competitive advantage (measured as above average financial performance) over their direct rivals, the previous model that tests the impact of quality management on financial performance (as a latent construct measured by two indicators: employee productivity and revenue per room) was split into two models. This is because financial performance as a latent construct cannot be split to identify above average financial performance (competitive advantage) and under average financial performance. As a result two models were tested in SEM; the first one investigated the impact of quality management on employee productivity and the second model investigated the impact of quality management on revenue per room. Each of the previous two models was subsequently subjected to multi-group analysis in SEM, in which two groups were identified the first one consisting of those hotels that have above average employee productivity / revenue per room (as indicators of competitive advantage) and the second group including those hotels that have under average employee productivity / revenue per room . The aim of the multi group analysis is to find out if there is a significant difference between the two groups of interest and which path coefficients cause that significant difference. In other words which path coefficients (QMPs) generate a competitive advantage?

Four models were tested separately in SEM in order to identify their goodness of fit (GOF). The first model tests the impact of QM on above average employee productivity (as indicator of competitive advantage), the second model tests the impact of QM on under average employee productivity, the third model tests the impact of QMPs on above average revenue per room (as an indicator of competitive advantage), and the fourth model tests the impact of QMPS on under average revenue per room. The results of the empirical analysis show that both models that test the impact of QM on above average EP and revenue per room (as indicators of competitive advantage) fit the data better than those two models that test the impact of QM on under average EP and revenue per room (see Table 5.2). More specific, the $\chi 2$ GOF statistics indicate that while the null hypothesis (model fits the data well) cannot be rejected in model 1 and 3 which tested the impact of QM on above average EP and revenue per room (as indicators of CA) it can be rejected in the other two models (2 and 4) that tests the impact of QM on under average EP and revenue per room. However, because the chi-square value depends on sample size and will almost always be significant with large samples (Harrington, 2009), other fit measures are also considered (see Table 5.2). They indicate that models 1 and 3 fit the data better than models 2 and 4. To date and to the researcher's knowledge, this is the first study that compared these models to find out which models fit the data well.

Subsequently, the model that shows the impact of QM on employee productivity is tested in SEM using the automated multi-group analysis techniques to find out whether or not the structural model (paths of the causal structure) are equivalent (i.e. invariant) across the two groups of interest (above and under employee productivity). Based on both CFI difference (ΔCFI) value (0.013 which exceeds the cut off value of -0.01) and $\chi2$ difference (Δ $\chi2$) value (107.7 with 34 degrees of freedom which is statistically significant at a probability of less than 0.001) between the the unconstrained/baseline model and the structural weights model (structural path coefficients are constrained equal across groups), there is evidence that the hypothesis of invariance across the two groups of interest (above and under EP) is rejected (Cheung and Rensvold, 2002; and Byrne, 2010).

Table 5-2: Summary of model fit indices for above average FP (above average EP and rev/room) and under average FP (under average EP and rev/room) models.

		AFM absolute fit measures			IFM incremental fit measures			PFM parsimony fit measures	
	$\chi2$ and probability value	**$\chi2$/df**	**RMSEA**	**SRMR**	**CFI**	**NFI**	**TLI**	**PNFI**	**PCFI**
Model 1: impact of QM on above average EP	$\chi2$ (213, N= 113) = 219.413, P=0.367	1.03	.016	.056	.997	.997	.997	.839	.761
Model 2: impact of QM on under average EP	$\chi2$ (213, N= 175)= 269.847, P<0.01	1.26	.039	.030	.985	.985	.982	.785	.829
Model 3: impact of QMPs on above average revenue per room	$\chi2$ (213, N= 111) = 232.02, P=0.177	1.089	.028	.061	.990	.991	.989	.834	.754
Model 4: impact of QMPS on under average revenue per room	$\chi2$ (213, N= 177) = 259.70, P<0.01	1.219	.035	.029	.988	.988	.986	.832	..788

In other words, the results of the multi group analysis (Δ $\chi2$ and ΔCFI) show that the full structural model (i.e. path coefficient) is completely non-equivalent across the two groups of interest (above/under average employee productivity). Therefore, there are some paths in the models which cause this variance, in other words, there are some paths in the model that can explain the reasons behind this variance and indicate which QM practices can differentiate those model that test the impact of QM on above average EP and revenue per room (as indicators of CA) from those models that test the impact of QM on under average EP and revenue per room.

The same process is adopted for the model that shows the impact of QM on revenue per room. This model was tested in SEM using automated multi-group analysis techniques to find out whether or not the structural models (path of the causal structure) are equivalent (i.e., invariant) across the two groups of interest (above and under employee revenue per room). Based on both CFI difference (ΔCFI) value (0.013 which exceeds the cut off value of -0.01) and $\chi2$ difference ($\Delta\ \chi2$) value (107.6 with 34 degrees of freedom which is statistically significant at a probability of less than 0.001) between the the unconstrained model and the structural weights model (structural path coefficients are constrained equal across groups), there is evidence that the hypothesis of invariance across the two groups of interest (above and under revenue per room) is rejected (Cheung and Rensvold , 2002; and Byrne, 2010). In other words, the results of the multi group analysis ($\Delta\ \chi2$ and ΔCFI) once again show that the full structural equation model (i.e. paths coefficient) is completely non-equivalent across the two groups of interest (above/under average revenue per room). To date and to the researcher's knowledge, this is the first study that employed the multi-group analysis techniques in SEM to find out whether or not the structural model (paths of the causal structure) are equivalent (i.e. invariant) across the two groups of interest (above and under employee productivity/revenue per room).

In order to identify the source of non-equivalence, the same hypotheses across each model two groups (above/under average employee productivity; and above/under average revenue per room) are tested. In other words, the same hypotheses (path coefficients) across the two groups of interest (above/under average revenue per room; and above/under revenue per room) are tested to find out which QM practices give the hotel competitive advantage over its rivals.

The empirical results of those models that test the impact of QM on competitive advantage (above average EP and above average revenue per room) and those models that test the impact of QM on under average EP and under average revenue per room, shows that neither quality data and reporting and process management give the hotels a competitive advantage nor decrease the hotels performance to become under the average of EP or revenue per room. Specifically, there is evidence that, quality data and reporting has a negative and insignificant impact on above average EP (path coefficient= - 0.05, P= 0.61) and has negative and weak significant impact on above average revenue per room (path coefficient= - 0.19, P<0.1). Similarly, there is evidence that, quality data and reporting has negative impact on under average EP (path coefficient = - 0.11, P=0.21), and positive but insignificant impact on under average revenue per room (path coefficient= 0.20, P= 0.21). In the same way, process management has a negative impact on above average EP (path coefficient =-0.26, P<0.05), and a negative but significant impact on above average revenue per room (path coefficient= -0.24, P<0.05). Likewise, process management has a positive significant impact on under average EP (path coefficient = 0.28, P<0.05), and a negative insignificant impact on under average revenue per room (path coefficient =-0.12, P=0.11). According to these results, we cannot, once again, suggest that both quality data and reporting and process management should not be the focus of improvement because they failed to give the hotel a competitive advantage, or that quality data and reporting and process management in hotels did not worsen employee productivity or revenue per room. However, it can be said that while these two QM practices (PM and QD&R) do not give the hotel a competitive advantage or worsen the hotel performance, they are necessary to keep the business of the hotel running (Samson and Terziovski, 1999). Managers may be wrongly implementing these two quality management practices (PM, and QD&R) in conjunction with truly beneficial QMPs (TML, EM, CF, and SP respectively) because there is no evidence on the literate to discover which QM practices generate a competitive advantage. Additionally, an explanation of the positive impact of PM on under average EP might be because some managers, inappropriately, implement process management as a quick-fix key to the problems facing their hotels at a certain point in time, they often confuse the implementation of a certain QM practice (i.e. PM) as an end in itself, rather than as a means to an end (Dale, 2003).

To date and to the researcher's knowledge, it is interesting to note that, the SEM results give evidence that the two widely documented quality management practices, customer focus and employee management, have a positive impact not only on competitive advantage (above average EP and revenue per room) but also on under average EP and revenue per room. In detail, the results of the SEM indicate that employee management has a positive standardized parameter estimate (0.22) and significant impact ($P< 0.05$) on above average EP (as an indicator of competitive advantage), and positive but weak significant impact on above average revenue per room (path coefficient =0.16, $P<0.1$). Similarly, the results of the SEM show that employee management has a positive but weak significant impact on under average EP (path coefficient =0.16, $P<0.1$) and a positive significant impact on under average revenue per room (path coefficient =0.26, $P<0.01$). Additionally, the results of the SEM indicate that customer focus has a positive significant impact on above average EP (path coefficient =0.21, $P<0.05$), and a positive significant impact on above average revenue per room (path coefficient =0.28, $P<0.01$). Similarly, customer focus was found to has a positive significant impact on under average EP (path coefficient =0.38, $P<0.001$), and a positive significant impact on under average revenue per room (path coefficient =0.40, $P<0.001$).

The above shown positive impact of employee management and customer focus on above average performance and under average performance raises doubts about the role of these two QM practices (EM, and CF) in generating a competitive advantage. One explanation of these results is that hotels whatever their performance level, above or under the average, implement and recognize the importance of employee management and customer focus for the proper implementation and success of QM. On the other hand, it cannot be concluded that these two (EM and CF) quality management practices, a lone, are a source of competitive advantage in hotels, as they are found to be implemented in both hotels that have above average performance (as indicators of CA) and under average performance. One explanation of the weak significant ($P\leq0.1$) impact of employee management on performance (above average revenue per room) is that employee can easily be lost if they are not satisfied, or if the organization has high (skilled) employee turnover (Ton and Huckman, 2008) which might decrease the organizations' performance, especially in the hotel industry which traditionally suffers from a high rate of employee turnover (Wasmuth and Davis, 1983; Hinkin and Tracey, 2000; and Cleveland et al., 2007).

Furthermore, the empirical results of models that test the impact of QM on above average performance (EP and revenue per room) and under average performance (EP and revenue per room) highlight the role of top management leadership to the success of QM efforts. TML is found to have direct positive and significant impact on most of the other quality management practices in both models that investigate the impact of QM on above and under average performance (see Tables 48 and 56). This result indicate once again, that top management leadership acts as a driver of achieving the other quality management practices by creating goals, policies, values, and systems to fulfil customer and other stakeholder's requirements.

The most important finding in this study is that two QM practices, total management leadership and supplier management, differentiate those hotels that have above average EP and revenue per room (as indicators of CA) from those hotels that have under average EP and revenue per room. In detail, the results of the SEM show that top management leadership has a positive significant impact on above average EP (path coefficient =0.43, $P<0.001$) and a positive significant impact on above average revenue per room (path coefficient =0.36, $P<0.001$). Similarly, supplier management has a positive significant impact on above average EP (path coefficient =0.25, $P<0.05$), and a positive significant impact on above average revenue per room (path coefficient =0.29, $P<0.01$). On the other hand, the results of the SEM show evidence that top management leadership has a small positive insignificant impact on under average EP (path coefficient =0.10, $P=0.33$) and a very small positive insignificant impact on under average revenue per room (path coefficient =0.01, $P=0.19$). While, SM has negative insignificant impact on under average EP (path coefficient =-0.09, $P=0.42$) and has a negative insignificant impact on under average revenue per room (path coefficient =-0.07, $P=0.51$)

The above results indicate that hotels that have support and leadership from their top management and good relationships and long term contracts with trusted supplier can achieve competitive advantage over their rivals. In details, the QM literature has totally emphasized the importance of top management leadership for QM success (Ahire and O'Shaughnessy, 1998; Beer, 2003; and Yeung et al., 2005). This study goes further and indicates that top management leadership (in addition to SM) not only improve hotel financial performance (as previously confirmed) but can also give the hotel a competitive advantage over its rivals. Specifically, hotels can generate a competitive advantage over their direct rivals when top management is able to translate the quality policy into measurable objectives that can be achieved in a specified timeframe and provide the necessary financial resources to implement quality management related practices. In addition to the support of the hotel top management, this study indicates that good relationships and long term contracts with trusted supplier enable the hotel to obtain a competitive advantage over their direct competitors.

5.3 Summary

This chapter interpreted the different results of the proposed research models in order to improve our understanding of the relationship between QM and CA. First, the results of the model that investigated the impact of QM on FP are discussed, shown that four (TML, EM, CF, and SM) QM practices have positive impact on the hotel financial performance. These results are compatible with the theoretical foundations of this study. Second, this study went further and investigated the impact of QM on CA. The discussed results showed that hotels that have top management commitment and leadership in addition to good relationships with trusted supplier can not only successfully implement the other QM practices but also gain a competitive advantage over their competitors, more than those hotels with low support and leadership of their top management and weak relationships with their supplier.

Chapter 6: Conclusion and limitations

6.1 Introduction

This thesis examines empirically the impact of quality management on competitive advantage. To achieve this main aim, many other objectives are achieved. These objectives include developing operational definitions for the study constructs (quality management and competitive advantage), testing the dimensional structure of quality management, identifying which quality management practices generate competitive advantage, and clarifying whether the relationship between quality management and competitive advantage is direct or indirect, and compare the current study findings (similarities and differences) in the light of the previous work in this field to improve our understanding of the relationship between QM and CA.

This chapter discusses in the first section 6.2 the thesis conclusion, followed by the contributions to knowledge, which are highlighted in Section 6.3. Then, Section 6.3 discusses the research limitations and avenues for future research.

6.2 Conclusion

This study sought to investigate the impact of quality management (QM) on competitive advantage (CA) in the Egyptian hotel industry. QM has received considerable attention in the last 50 years. According to the resource based view (RBV) of CA, QM is one of the most important and significant sources of CA, that is difficult to imitate (Zhi-yu et al., 2006). Despite the important theoretical role of quality management in improving business performance and achieving competitive advantage, few empirical studies have been done within the context of the service industry, and in particular there is an absence in the hotel industry. Among those studies that investigate the impact of QM on business performance and competitive advantage, there is a lack of clarity concerning the dimensional structure of the quality management construct, which quality management practices generate CA, and whether the relationship between quality management and competitive advantage is direct or indirect. This lack of clarity might be due to difference in the dimensions that were used to measure QM and CA, and/or difference in the employed data analysis methods and due to the ceteris paribus assumption of previous studies (see Section 2.3).

Because the first step in transforming a concept to be measurable is to provide a conceptual definition of this concept, the current study started by reviewing the literature to find or propose a conceptual definition for both QM and CA. A new definition of QM (mainly adopted from the ISO 9000 definition of QM, with some modifications) is provided, QM is defined as: practices that direct and control an organization in order to achieve (quality) a situation when a set of inherent characteristics consistently fulfils the continuously changing requirements of the organization's customers and other stakeholders. CA is defined as achieving above average performance as compared to the firm competitors in its industry.

A conceptual framework was then developed, based on an extensive review of the previous studies, to illustrate the interrelations between QM practices and their impact on CA, so the reader can understand the theorized relationships between these two variables; QM and CA. This conceptual framework guided the research, determining what variables would be measured and the statistical relationship that should be tested, as illustrated in chapter two (literature review).

In the beginning of chapter three (methodology), an extensive review of the previous empirical studies published between 1989-2011 that investigated the relationship between QM and its outcomes (including CA) was conducted to find valid measures of QM . This process yielded six potential dimensions of QM (employed in the current study to measure QM) that are widely covered and validated in the previous empirical studies: top management leadership (TML), customer focus (CF), employee management (EM), supplier management(SM), quality data and reporting (QD&R) and process management (PM). A continuous scale from 0 to 10 was used to measure for how long a QM practice has been implemented in a hotel. Additionally, given the limitations of the perceptual measures of CA (which typically contain systematic biases and random measurement errors) employed in previous studies, the current study employed two objective indicators to measure CA: above average employee productivity and above average revenue per room.

In this study, data obtained from surveying 384 four and five star hotels in Egypt was used to test the impact of QM on CA. A total of 300 responses (130 from five star hotels and 170 from four star hotels) were obtained using four data collection techniques: interviews (15), e-mails (15), mail (20), and DCS (250). Twelve uncompleted questionnaires (six from four star hotels, and six from five star hotels) were removed, leaving 288 usable questionnaires and yielding a response rate of 75%. All questionnaires were completed by the hotel general managers.

Prior to testing the current study model, the dimensional structure of QM was first examined. All the indicators that were employed to measure QM were subjected to exploratory factor analysis (EFA) in SPSS to find out how many factors (dimensions) they suggest. EFA produced a six-factor solution, representing top management leadership, employee management customer focus, supplier management, process management and quality data and reporting. EFA, although it can identify factors present in a specific scale as well as items that weigh most highly onto each factor, does not necessarily test dimensionality. For example, variables might be correlated for several reasons, besides being measures of the same factor: the factors may be measuring higher order factors (this assumes that the factors are measures of one dimension of another construct), or the factors may represent different dimensions of a construct. Therefore confirmatory factor analysis (CFA) was employed in the current study to test the dimensional structure of the QM construct. All necessary conditions to run a CFA, i.e. conditions regarding the sample size, missing data, outliers, normality, and multicollinerity, were met. Three models were specified (1) an oblique model (factors are freely correlated); (2) a higher order factor model (factors are correlated because they all measure one higher order factor); and (3) a one factor model (all indicators are measuring one construct). The results of the goodness of model fit (GOF) of these three models shows that model (1) is the best model, which fits the data better than the other two models which affirms that QM is a multidimensional construct. This result provides solid statistical evidence that shows the multidimensionality of the QM construct and contradicts other studies that employed QM as a unidimensional construct, such as those by Flynn et al. (1994), Douglas and Judge (2001), Prajgo and Brownl (2004), Barker and Emery (2006), Prajogo and Sohal (2006), Terziovski (2006) and Su et al. (2008). This result helps resolving the problems that might arise from the lack of clarity concerning the dimensional structure of QM, as without testing the dimensional structure of a measure, researchers cannot assume that the significant correlation is a result of factors measuring the same construct.

The impact of QM on financial performance (measured by employee productivity and revenue per room) was first tested, as it has received much of attention in the literature, using structural equation modelling (SEM). SEM is appropriate technique that serves the purpose of the current study as it allows analysing multiple and interrelated causal relationships among the latent constructs while taking into account the estimated measurement error. The SEM results indicate that some QM practices such as TML, EM, CF, and SM directly improve the firm (hotel) financial performance but other QM practices such as PM and QD&R do not. These results are consistent with Powell (1995), Dow et al. (1999) and Sila and Ebrahimpour (2005) and provide evidence against the interdependence assumption of quality management (where no direct relationship between quality management and organization performance can be established but one practice should affect the other to improve the organization performance), which was concluded by several authors such as Flynn et al. (1995), Hendrcks and Singhal (1997), Easton and Jarell (1998), Kaynak (2003), Zu et al. (2008), Su et al. (2008) and Zu et al. (2009).

This study investigated further and for the first time up to date and to the researcher's knowledge the impact of QM on CA (above average financial performance). Two groups of hotels (those with above average FP and those with under average FP) were compared to each other to identify which QM practices can generate CA. The empirical analysis affirm that hotels that have top management commitment and leadership in addition to good relationships with some trusted supplier can successfully implement not only the other QM practices but also can gain a competitive advantage over their competitors more than those hotels without or with low top management commitment and leadership and weak relationships with supplier. In other words, if hotel managers select only certain quality management practices (i.e. CF, and EM) without strong top management support and suppers' management, quality management would be ineffective in improving the hotel competitive advantage among rivals. Finally, the models have been validated by using the bootstrap technique in SEM.

6.3 Contributions of the Study

The main contribution of this research to the body of knowledge (strategic sources of competitive advantage and more specifically, the relationship between QM and CA) is achieved by providing empirical research that investigates the impact of quality management on firm (hotel) competitive advantage, to identify which QM practices generate a competitive advantage. The contributions of this study can be considered in terms of three areas: the theoretical level (QM/CA theories and quality management / competitive advantage research), the research methodology, and the practical level (empirical evidence for practicing managers).

6.3.1 Theoretical Level

This study includes insight and contributions for both QM theory and quality management researchers as follows: The current study critically evaluated the existing definitions of quality, quality management, and competitive advantage using Routio's (2009) criteria (see Section 2.2) and introduced valid and reliable definitions of the study concepts (quality, quality management, and competitive advantage).

Several studies have examined the relationship between different practices of quality management and business performance. However, there is a lack of studies investigating the impact of quality management on competitive advantage, especially an absence in the hotel industry (see Table1.1). The current study contributes in providing further evidence (model) for quality management research that contributes to enhance our understanding and knowledge of the causal relationship between quality management and competitive advantage. Additionally, this study contributes in identifying which quality management practices the firm can adopt not only to improve its financial performance but to gain also a competitive advantage over its direct rivals. Moreover, the proposed conceptual framework contributes in improving our understanding about the direct and indirect relationships between QM and financial performance/or competitive advantage. This framework can be employed in similar researches to investigates similar relationships.

6.3.2 Methodological level

In methodological terms, there are several contributions. In research practice, several statistical techniques are employed to analyse the dimensional properties of a construct, including coefficient alpha, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). Given the limitations of coefficient alpha and EFA, CFA can be employed to test the dimensional structure of a construct (Hair et al., 2006; and Kline, 2011), as a significant correlation in EFA does not necessarily indicate that a factor measures the same construct (Rubio et al., 2001). To this author's knowledge, this is the first study that tests the dimensional structure of quality management through the use of EFA that is then tested further with a CFA as part of structural equation modelling. CFA can test various models that may provide a better insight into dimensional properties of a construct. These models include a model that allows all factors to be freely correlated (oblique factor model), a model where all factors are correlated because they all measure one higher order factor (higher order factor model), and a model where all indicators are employed to test if they measure only one construct (one factor model). The results of these three models give evidence that support the multidimensional nature of the quality management construct. Additionally, the current study uses a large sample size (288). The greatest advantage of that large sample size is that it has permitted employing more sophisticated analysis techniques, such as SEM. This has assisted the researcher to successfully test the interdependence assumption of the quality management practices.

Furthermore, to date and to the author's knowledge, this is the first study that uses the multi group analysis technique in SEM to find out if there is a significant difference between the two groups of interest (hotels with above and under average financial performance) and which path coefficients cause that significant difference. In other words which path coefficients (QM practices) generate a competitive advantage? This has enabled the researcher to effectively identify the causal relationship between QM practices and CA. Moreover, to date and to the author's knowledge, this is the first study that validated the investigated model by using the bootstrap technique in SEM. Additionally, two techniques are employed in this study to make sure that there is no evidence of common method variance which can cause a regular measurement error and further bias the estimates of the actual relationship among theoretical factors. These two techniques (Harman one-factor analysis and tests further by CFA) indicate that common method bias is not a serious concern in this study. Finally, this study developed a valid and reliable scale to measure QM and CA; this scale can be replicated in other studies.

6.3.3 Practical Level

The findings of this study, in general, provide evidence that explain which quality management practices can generate a competitive advantage and, in particular, help hotel managers with the allocation of resources to those QM practices that have the most significant effect on hotel competitive advantage. More specifically, for hotel managers, the study provides reliable evidence that certain key quality management practices not only improve hotel financial performance but also give hotel a competitive advantage over its rivals. This gives hotel managers evidence that some specific quality management practices, such as top management leadership, employee management, customer focus, and supplier management, can improve the hotel financial performance. Additionally, the results indicate that hotels that have top management commitment and leadership in addition to supplier management can not only successfully implement the other QM practices but also gain a competitive advantage over their competitors more than those hotels without or with low top management commitment and with weak relationships with trusted supplier. In other words, if hotel managers select only certain quality management practices (i.e. customer focus, employee management) without strong top management support and long term contracts with some trusted supplier, quality management would be ineffective in improving the hotel competitive advantage among rivals.

Conversely, the results of this study raise doubts for hotel managers concerning the usefulness of some quality management practices, such as quality data and reporting and process management. These practices may have several benefits in helping to run the business of the hotel (Samson and Terziovski, 1999), but managers may be wrongly implementing these two quality management practices (PM, and QD&R) in conjunction with truly beneficial QMPs (TML, EM, CF, and SP respectively) because they are unable to discover which QMPs are really generate a competitive advantage. Therefore, managers need to be cautious about adopting them.

Additionally, the current study findings may enable the hotel managers to revise or modify their current quality management activities in order to achieve a superior performance that gives them a competitive advantage over their rivals.

Finally, the results of this study may also be of value to the Egyptian government in their attempts to develop measures that enhance global competitiveness of the Egyptian hotel industry.

6.4 Limitations and avenues for future research

The current study investigates the impact of quality management on competitive advantage (measured as above average financial performance). However, apart from QM, other factors may also enhance the firm financial performance and may give the firm a competitive advantage over its rivals, such as effective marketing strategies (Jocumsen, 2002), reputation (Flatt and Kowalczyk, 2008), brand equity (Gordon et al., 1993), possession of raw materials, low cost manufacturing , distribution systems, and production capacity (Porter, 1985), government rules (Pekar and Sekanina, 2007), financial structure and access to capital (Juri, 2004), and strategic alliances (Culpan, 2008).

It is worth noting here that, according to the ceteris paribus assumption, the researcher held constant all these independent variables other than the one under study (quality management), so the effect of a single independent variable on the dependent variable (financial performance/CA) would be isolated.

QP (quality performance) was held as an unmeasured concept in the current study; it is supposed to intervene in the relationship between quality management and competitive advantage but its effect can be theoretically inferred from the effect of quality management on competitive advantage (measured as above average financial performance). However, the previously proposed conceptual definition of quality addressed in defining the study concept (see Section 2.1.1) may be a step towards developing an operational definition to facilitate measuring quality for further empirical research.

This study also suffered from a limitation common to survey research and SEM. The current study survey, like most of the studies applied in this area and due to time and money constraints, is a cross sectional sample at one specific point in time. As a result, while causal relationships can be inferred, they cannot be strictly proven. One of the main requirements of confirming causality between the research variables is temporal ordering (i.e. cause must be revealed to unambiguously precede an effect) (Bullock et al, 1994). Temporal ordering can only be confirmed by a longitudinal study; cross-sectional data is not sufficient to confirm temporal ordering. Therefore, a longitudinal research design would be necessary to properly test the causal relationships between quality management and competitive advantage.

The current study investigated 4 and five star hotels in Egypt, however further studies can investigate 1,2 and 3 star hotels to find out how QM can contribute to improve the financial performance and CA in these hotels. Additionally, this study can be replicated in a different country or industry. Additionally, other methodologies and financial performance measures could be used to test the causal impacts of QM on CA.

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Appendix 1: Evaluation of quality definitions (literature review)

	Author	*Definition*	Routio's (2009) criteria	Details
	1- Tuchman (1980: 38)	Quality means "investment of the best skill and effort possible to produce the finest and most admirable results possible....You do it well or you do it half-well....Quality is achieving or reaching for the highest standard as against being satisfied with the sloppy or fraudulent....It does not allow compromise with the second-rate''.	Valid ☒ Reliable ☒ No figurative language ☒ Not a vicious circle ☑	Garvin (1984) called Tuchman (1980) definition of quality as the transcendent approach of philosophy. The transcendent definition of quality is derived from philosophy and borrows heavily from Plato's discussion of beauty (quality is synonymous with innate excellence (Seawright and Young, 1996). Producing an excellent product or service according to Tuchman (1980) definition provides strong benefits for human resource and marketing because the organizational vision that based upon introducing the 'best' may be more easier to be articulated than one aimed at introducing value for the customer. Moreover, obtaining employee agreement of and commitment to that vision may also be easier. Excellence often is the strategy for advertising campaigns in several industries such as automobiles (Reeves and Bednar, 1994). However, Tuchman's (1980) definition of quality is invalid, contains figurative language and is not reliable according to Routio's (2009) criteria because defining quality as excellence provides little practical directions to managers. How does one determine whether or to what extent excellence has been attained? Who determines the standards of excellence?'' (Carol and David 1994:428). Moreover for researchers, a definition of quality as excellence makes it difficult, if not impossible, to measure (not reliable) and test the impact of quality on performance and other variables of interest (Garvin, 1984).
	2-Leffler (1982).	Quality is based on the presence or absence of a particular attribute. If an attribute is desirable, greater amounts of that attribute, under this definition, would label that product or service as one of a higher quality	Valid ☒ Reliable ☑ No figurative language ☑ Not a vicious circle ☑	Garvin (1984) called Tuchman (1980) definition of quality as the product based approach, where, in the economic literature, scholars such as (Schmalensee, 1970; Swan, 1971) evaluated quality as durability or long product life. They claimed that increases of product characteristics levels are equivalent to increase in quality. This definition of quality is reliable according to Routio's (2009) criteria because measuring quality according to this definition is an easy task, where the organization can monitor progress in achieving its goals by measuring the quantity of the desired attributes in the product (Reeves and Bednar, 1994). However, this definition is invalid according to Routio's criteria because according to this definition higher quality can only be obtained at higher cost as the quality reflects the quantity of attributes that a product contains, and because attributes are considered to be costly to produce, higher quality goods will be more expensive (Garvin, 1984). Moreover, quality under this definition may be inappropriate for services, especially when a high degree of human contact is involved (Reeves and Bednar, 1994).

☑ : Criteria was met

☒ : Criteria was not met

	3- Shewhart (1931) and Levitt (1972)	Quality is defined as conformance to specifications. Quality of conformance relates to the degree to which a product meets certain design standards.		Valid ☒ Reliable ☑ No figurative language ☑ Not a vicious circle ☑	Garvin (1984) called Shewhart (1931) and Levitt (1972) definition of quality as the manufacturing based approach. This definition is reliable according to Routio's (2009) criteria because this definition gives a precise and objective measurement of quality (Sebastianelli and Tamimi, 2002). However this definition of quality is invalid according to Routio's (2009) criteria because customers may not know or care about how well the product conformed to internal specifications. Additionally, the internal focus of a conformance-to-specifications definition of quality makes it likely that a firm will be unaware of or ignore what competitors are doing. Thus, competitors may be driving customer requirements to new heights while a firm continues to meet internal specifications (Hofer & Schendel, 1978). As a result, Crosby [1979] revised this definition to be conformance to requirements. This modification strengthen Shewhart's (1931) and Levitt's (1972) definition of quality by meeting both the internal specification and the external customer needs so it can drive the organization towards both efficient and effective product delivery (Reeves and Bednar, 1994). However, after Crosby (1979) modification, this definition is still invalid according to Routio's (2009) criteria because of two reasons. First, customer is one of the stakeholders and there are parties other than the customer that have a stake in the organization and what it does but may not receive a product (Hoyle, 2007). Therefore, the term quality is not only to be defined relative to customer requirements but also to the other stakeholders requirements (Hoyle, 2007). Second, "what the customers (and other stakeholders) expect today is not what they expected yesterday and will not be what they will expect tomorrow. Similarly, what you can do for them today is not what you could do for them yesterday or what you will be able to do for them tomorrow" (Ryall and Kruithof, 2001:20).
		4- Juran and Godfrey (1999:2.2).	Fitness for use. ''the extent to which a product successfully serves the purposes of the user''	Valid ☒ Reliable ☑ No figurative language ☑ Not a vicious circle ☑	Garvin (1984) called Juran and Godfrey's (1999) definition of quality as customer based approach. This definition has roots in the early definitions of quality as Juran (1951) claimed that quality is composed of two parts: the quality of design and the quality of conformance. Where quality of design refereed to providing satisfaction to customer by designing product that met their needs. He later coined the widely used 'fitness for use' definition of quality, where**,** use is apparently associated with customer requirements, and fitness suggests conformance to measurable product characteristics (Nanda, 2005). Juran and Godfrey's (1999) definition of quality is reliable according to Routio's (2009) criteria because both the internal specification and the customer requirements can be identified and then measured. However Juran and

					Godfrey's (1999) definition of quality is invalid according to Routio's (2009) criteria because it ignores the price (value) factor where product/service price may influence the level of the customer satisfaction (Sebastianelli and Tamimi, 2002). Moreover, it ignores the other stakeholders (apart from the customer) and their frequently changing requirements.
		5) Feigenbaum (1951:10)	Quality is "best for certain customer conditions". Quality under this definition consists of a product or a service to a customer with certain characteristics at an expectable cost or price.	Valid ☒ Reliable ☒ No figurative language ☑ Not a vicious circle ☑	Garvin (1984) called Feigenbaum's (1951) definition of quality as value-based approach. It is worth to notice that the word *service* is not explicitly addressed in Feigenbaum's (1951) definition of quality until his third edition of his book (total quality control 1983:7). Additionally Broh, 1982; Ishikawa and Lu 1985 stated that the value-based quality definitions are an extension of user-based definitions where, quality is defined as fitness for use at an acceptable price. However, Feigenbaum's (1951) definition of quality takes into account two measurable factors (1) external effectiveness (the extent to which external customer requirements are met) and (2) internal efficiency (cost implications of internal conformance to specification) Reeves and Bednar, 1994). However this definition still is not reliable according to Routio's (2009) criteria because it is not easy to identify the individual components that go into a value judgment such that a manager or researcher would know (a) what components are essential and (b) what weights an individual gives to those components. For example, price might be the main concern in a value judgment for undifferentiated products such as compact discs, yet it might be a minor concern in a health-care situation (Reeves and Bednar, 1994). Additionally, this definition of quality is invalid according to Routio's (2009) criteria because value and quality are different concepts, value is understood by some to be a: subcomponent of quality, whereas others seen quality as a subcomponent of value (Stahl and Bounds, 1991). Likewise, it is invalid definition as it ignores the other stakeholders (apart from the customer) and their frequently changed requirements as previously explained.
	6- Taguchi (1987:1)	Quality is ''the loss a product causes to society after being shipped, other than any losses caused by its intrinsic functions. This loss can be caused either by variability in the product's function or by adverse side effects''		Valid ☒ Reliable ☒ No figurative language ☑ Not a vicious circle ☑	Taguchi (1987) added one more approach in defining quality (the social loss approach). Where losses that are caused be harmful side effects are what economists called an external diseconomies of or consumption production, diseconomies of production happen when a producer's activities result in an uncompensated loss to others, Taguchi's social-loss function approach in defining quality would classically categorize cigarettes as low quality item because of the negative externalities related with their consumption, even if a the brand has both high conformance and customer demand (Russell and Miles, 1998). Taguchi's (1987) definition of quality is invalid and not reliable according to Routio's (2009) criteria as the definition does not match the

				concept. His definition may be refined as the cost of non-quality (Logothetis (1992: 13). Additionally, Flood (1993:32–33) claimed that Taguchi definition of quality may be useful in manufacturing industry not in service industry.
7	**Flood(1993:48)**	"Quality means meeting customer(agreed) requirements, formal and informal, at the lowest cost, first time every time" Customers: may be internal or external to the organization Agreed: means that there is an ideal to strive for but it needs to be agreed by all parties concerned(external customer and decision maker within an organisation) Requirements : measurable specifications(durability; reliability; accuracy; speed; method of delivery and price) Formal and informal : agreements made both in a formal business-like manner, and to those informally established through interaction (may be positive or negative) and must be assessed and managed Lowest cost : means that there is no unnecessary loss or waste in time, effort or material in the production and delivery of the product or service First time every time: sets an ideal to carry through a policy of 'no licences to fail'. In other words, according to agreed requirements, a company will not accept standards in product or service that fall below those expectations.	Valid ☒ Reliable ☑ No figurative language ☑ Not a vicious circle ☑	Flood (1993) has tried to strength his definition by including the meaning of different approaches in his definition such as the customer based vew, product, manufacture based view and the value based view as well, however his definition is still invalid and not reliable according to Routio's (2009) criteria as it ignores the other stakeholders (apart from the customer) in the quality definition.
8	**Ryall and Kruithof (2001:20)**	"Quality is consistently meeting the continuously negotiated needs and expectations of Customers, in the context of the needs and expectations of other interested parties, in ways that create value and satisfaction for all involved"	Valid ☒ Reliable ☒ No figurative language ☑ Not a vicious circle ☑	Ryall and Kruithof (2001) have tried to strength their definition by emphasizing some aspects such as the continuity aspect of the quality definition. Moreover this definition underlines- and for the first time- the needs of the organization interested parties. Additionally, the definition emphasizes on the win- win principle and value added concept for all the parties involved. However it still invalid and not reliable according to Routio's (2009) criteria for two reasons. Firstly, customer expectations are difficult to be measured. Second, perhaps the phtrase interested parties is not quite appropriate. ISO 9000:2005 defined an interested party as a person or group having an

				interest in the performance or success of an organization. But, Hoyle (2007) claimed that the organization may not have an interest in all of them. Consider for instance, competitors, criminals and terrorists. None of these has put anything into the organization and their interest is more likely to be malevolent than benevolent, so in these cases the organization fights off their interests rather than satisfying them. So a better word than interested parties would be stakeholders, for example customers, owners, employee, contractors, supplier, investors, unions, partners or society.
9	**Oakland(2003: 5)**	"Meeting the customer requirements"	Valid ✗ Reliable ✓ No figurative language ✓ Not a vicious circle ✓	Oakland's (2003) definition of quality is reliable according to Routio's (2009) criteria as it allows researchers and managers to include some measurable factors such as (courtesy, helpfulness, confidence, and appearance) that are critical to customer judgments. Additionally, it is possible to determine what is essential to customer rather than establishing standards that are based on management judgments which may or may not be accurate (Reeves and Bednar, 1994). However, Oakland's (2003) definition of quality is invalid according to Routioo's (2009) criteria as customer is one of the stakeholders and there are parties other than the customer that have a stake in the organization and what it does but may not receive a product. The term quality is not defined relative to customers but to requirements and these stakeholders do have requirements (Hoyle, 2007). Moreover, "what the customers (and other stakeholders) expect today is not what they expected yesterday and will not be what they will expect tomorrow. Similarly, what you can do for them today is not what you could do for them yesterday or what you will be able to do for them tomorrow" (Ryall and Kruithof, 2001:20).
10	**American society for quality control (2004)**	The total features and characteristics of a product or a service made or performed according to specifications to satisfy customers at the time of purchase and during use	Valid ✗ Reliable ✓ No figurative language ✓ Not a vicious circle ✓	This definition is invalid according to Routio's (2009) criteria as The definition fails to cover the requirements of the other stakeholders (apart from the customer) as previously explained.
11	**Kemp (2006:331)**	" all elements of our product that add value for the customer or stakeholders, or are required for our product or service to meet relevant standards and regulations"	Valid ✗ Reliable ✗ No figurative language ✗ Not a vicious circle ✓	Kemp's (2006) defintion comprises not only the customer but also the organization stakeholders. Additionally, it includes the meaning of conformance to specifications and regulation. However it is invalid according to Routio's (2009) criteria as it fails to recognize the continuously changing requirements in the quality definition as previously explained, additionally it is not reliable as it raises some questions about which element should be included in the quality definition and how it will be measured. Moreover it has a figurative language as the meaning of added value is not clear.

12	**Hoyle (2007:10)**	“Quality is the extent to which a product or service successfully serves the purposes of the user during usage (not just at the point of sale).”	Valid ☒ Reliable ☒ No figurative language ☑ Not a vicious circle ☑	Hoyle’s (2007) definition of quality comprises the advantage of both the product and user based view of quality definition and useful for the manufacturing and service industry. However, it is invalid and not reliable definition of quality according to Routio’s (2009) criteria as it raises some questions about how that word ‘extent’ can be measured. Additionally it fails to consider the requirements of the all stakeholders not only the user.
13	**Nelsen and Daniels(2007:54)**	"quality have two meanings: 1. the characteristics of a product or service that bear on its ability to satisfy stated or implied needs; 2. a product or service free of deficiencies" .	Valid ☒ Reliable ☑ No figurative language ☑ Not a vicious circle ☑	Nelsen and Daniels’s (2007) definition of quality is invalid according to Routio’s (2009) criteria as the two parts of this definition ignores the requirements of the organization stakeholders (apart from the customer) and focus either on the customer or on the product freedom of deficiencies. Additionally, the two parts of this definition fail to recognize the continuously changing requirements in the quality definition as previously explained.
14	**Zairi et al (1994)**	"A positive attempt by the organizations concerned to improve structural, infrastructural, attitudinal, behavioural and methodological ways of delivering to the end customer, with emphasis on: consistency, improvements in quality, competitive enhancements, all with the aim of satisfying or delighting the end customer."	Valid ☒ Reliable ☑ No figurative language ☑ Not a vicious circle ☑	Zairi et al.’s (1994) definition of quality is invalid according to Routio’s (2009) criteria as the this definition ignores the requirements of the organization stakeholders (apart from the customer) and focuses only on the end customer .
14	**UNI EN ISO 9000 (2005:17)**	“Degree to which a set of inherent characteristics fulfils requirements” "Inherent", as opposed to "assigned", means existing in something, especially as a permanent characteristics. Requirement: Need or expectation that is stated, generally implied or obligatory. "Generally implied" means that it is custom or common practice for the organization, its Customers and other interested parties Organization: Group of people and facilities with an arrangement of responsibilities, authorities and relationships. Customer: Organization or person that receives a product. Interested party: Person or group having an interest in the performance or success of an organization. Example: Customers, owners, people in an organization, supplier, bankers, unions, partners or society.	Valid ☒ Reliable ☒ No figurative language ☑ Not a vicious circle ☑	ISO definition of quality is a universal definition and adopted by a wide range of organizations all over the world both manufacturing and service organizations as it successfully covers a lot of aspects in defining quality including customer requirements, and product and/or service conformance to predetermined characteristics. However, this definition is not reliable according to Routio’s (2009) criteria because customer expectation cannot be measured as customers do not know what their expectations are, particularly with infrequently purchase of product and/or service (Cameron and Whetten, 1983; Lawrence and Reeves, 1993). Additionally, this definition is invalid according to Routio’s (2009) criteria as organization interested parties concept may be inappropriate and the better word should be stakeholders (explained in details before), and finally this definition fails to cover the continuous review of the quality definition as previously discussed.

Appendix 2: Evaluation of quality management definitions (literature review)

	Author	Definition	Routio's (2009) criteria	Details
1	**Dean and Bowen (1994:394)**	Total quality is "a philosophy or an approach to management that can be characterized by its principles, practices, and techniques". Its three principles are customer focus, continuous improvement, and teamwork. Each principle is used through a set of practices, which are simply activities such as collecting customer information or analysing processes. The practices are, in turn, supported by a: wide array of techniques (i.e. specific step-by-step methods intended to make the practices effective).	Valid ☒ Reliable ☑ No figurative language ☑ Not a vicious circle ☑	Dean and Bowen's (1994:394) definition of total quality has been adapted, and expanded throughout the literature as a definition of QM by several scholars such as Dow et al. (1999), Sousa and Voss (2002), Nair (2006), Holmlund (2007), and Zu et al. (2008). This definition of quality management is invalid according to Routio's (2009) criteria as the definition does not match the concept. This definition of total quality is misinterpreted by many scholars as a definition of QM. It is worth to mention that TQM is considered one approach to quality management- that may contains many approaches and practices – in other words TQM may be a part of quality management not equal to the meaning of quality management.
2	**Flynn et al. (1994:342)**	"Integrated approach to achieving and sustaining high quality output, focusing on the maintenance and continuous improvement of processes and defect prevention at all levels and in all functions of the organization, in order to meet or exceed customer expectations".	Valid ☒ Reliable ☒ No figurative language ☑ Not a vicious circle ☑	This definition is invalid and unreliable definition according to Routio's (2009) criteria because it encompassed invalid and not reliable definition of quality- meet or exceeds customer expectation- according to what was previously discussed in the quality definition Section 2.2.1.
3	**Klefsjo et al. (2008:125)**	"Quality management should be interpreted as management of quality".	Valid ☒ Reliable ☒ No figurative language ☑ Not a vicious circle ☒	This definition is invalid, unreliable and has a vicious circle according to Routios's (2009) criteria as we cannot define something by repeating the same words.
4	**Encyclopedia of Japanese Business and Management edited by Allan Bird (2007: 375)**	"A system of means for economically producing goods or services to satisfy the needs of the customers".	Valid ☒ Reliable ☒ No figurative language ☒ Not a vicious circle ☑	This definition of quality is invalid, unreliable and has a figurative language according to Routio's (2009) criteria because, the exact meaning of that 'system of means' is not clear. Additionally, Bird's (2007) definition is invalid as it defines quality management without clarifying an explicit meaning of the management concept within the QM definition

5	**Kaynak and Hartley(2005:256)**	QM can be defined as "a holistic management philosophy that strives for continuous improvement in all functions of an organization. QM can be achieved only if the quality concept is used in all organizational processes starting from the acquisition of resources to customer service after the sale"	Valid ☒ Reliable ☑ No figurative language ☑ Not a vicious circle ☒	Kaynak and Hartley's (2005) definition of quality management is invalid according to Routio's (2009) criteria because this definition just refers to the quality concept and does not reflect or include the meaning of quality within the quality management definition.
6	**quality glossary by Nelsen and Daniels(2007:54)**	"The application of a quality management system in managing a process to achieve maximum customer satisfaction at the lowest overall cost to the organization while continuing to improve the process".	Valid ☒ Reliable ☒ No figurative language ☑ Not a vicious circle ☑	This definition of quality is invalid and unreliable according to Routio's (2009) criteria because this definition defines quality management by its output; to achieve maximum customer satisfaction at the lowest overall cost and does not reflect the management concept in the definition. They just said 'in managing a process' but do not clarify the meaning of management.
7	**ISO 9000 (2005:21)**	"Coordinated activities to direct and control an organization with regard to quality. Activities to direct and control with regard to quality generally includes establishment of the quality policy and quality objectives, quality planning, quality control, quality assurance and quality improvement. Quality policy : Overall intentions and direction of an organization related to quality as formally expressed by top management Quality objectives: Something sought, or aimed for, related to quality. Quality objectives are generally based on the organization's quality policy Quality planning: Part of quality management focused on setting quality objectives and specifying necessary operational processes and related resources to fulfil the quality objectives. Where process is a Set of interrelated or interacting activities which transforms inputs into outputs Quality control: Part of quality management focused on fulfilling quality requirements. Quality assurance: Part of quality management focused on providing confidence that quality requirements will be fulfilled. Quality improvement: Part of quality management focused on increasing the ability to fulfil quality requirements. Quality : has been defined in details before"	Valid ☒ Reliable ☒ No figurative language ☑ Not a vicious circle ☑	ISO (2005) definition of quality management introduced by a team of experts, academics and practitioners (ISO 9000, 2005). It successfully combines the meaning of management and the concept of quality as well. However, this definition is an invalid definition according to Routio's (2009) criteria because it encompassed invalid definition of quality as previously explained in the quality definition section.

8	**Zairi et al. (1994)**	"A positive attempt by the organizations concerned to improve structural, infrastructural, attitudinal, behavioral and methodological ways of delivering to the end customer, with emphasis on: consistency, improvements in quality, competitive enhancements, all with the aim of satisfying or delighting the end customer."	Valid ☒ Reliable ☑ No figurative language ☑ Not a vicious circle ☑	Zairi et al. (1994) definition of quality is invalid according to Routio's (2009) criteria as the this definition ignores the requirements of the organization stakeholders (apart from the customer) and focuses only on the end customer .
9	**Nanda (2005:8)**	"All activities that are required to plan for quality in an organization, and all activities that are required to satisfy quality objectives". Specifically, quality management comprises the following four elements 1. Quality planning 2. Quality control 3. Quality assurance 4. Quality improvement "	Valid ☒ Reliable ☑ No figurative language ☑ Not a vicious circle ☑	This definition just refers to the quality concept and does not reflect or include the meaning of quality within the quality management definition. So it can be said that it is an invalid definition according to Routio's (2009) criteria.

Appendix 3: Evaluation of competitive advantage definitions (literature review)

	Author	Definition	Routio's (2009) criteria	Details
1	Penrose (1959:218).	"firms that are both larger and older in any economy or industry do tend to have many competitive advantages over smaller or newer firms no matter how able the management of the latter may be''	Valid ☒ Reliable ☑ No figurative language ☑ Not a vicious circle ☑	These definitions of competitive advantage are invalid according to Routio's (2009) criteria as the definitions do not match the concept, because competitive advantage is defined as shorthand for sources of competitive advantage, and the definition of the concept (CA) itself is unaddressed.
5	Barney (1991:102).	"A firm is said to have a competitive advantage when it is implementing a value creating strategy not simultaneously being implemented by any current or potential competitors"	Valid ☒ Reliable ☑ No figurative language ☑ Not a vicious circle ☑	
10	Wiggins and Ruefli (2002:84).	Competitive advantage "is a capability (or set of capabilities) or resources (or set of resources) that gives a firm an advantage over its competitors".	Valid ☒ Reliable ☑ No figurative language ☑ Not a vicious circle ☑	
6	Collis and Montgomery(1995:120)	"Competitive advantage, whatever its sources, ultimately can be attributed to the ownership of a valuable resources that enables the company to perform activities better or more cheaply than its competitors"	Valid ☒ Reliable ☑ No figurative language ☑ Not a vicious circle ☑	
4	Bamberger(1989)	"A competitive advantage can be defined as a unique position a firm develops in comparison with its competitors"	Valid ☒ Reliable ☒ No figurative language ☒ Not a vicious circle ☑	These definitions of quality have a figurative language according to Routio's (2009) criteria, which creates ambiguity about the real meaning of 'unique position' in Bamberger's(1989) definition or the real meaning of 'differential between two competitors on any

9	Ma (2000:20)	Competitive advantage "is the differential between two competitors on any conceivable dimension to allow one to better create customer value than the other"	Valid ☒ Reliable ☒ No figurative language ☒ Not a vicious circle ☑	conceivable dimension' in Ma's (2000) definition , or the real meaning of 'more effectively' in Thompson and Martin's (2006) defintion . These ambiguities make these definitions invalid and unreliable as well.
13	Thompson and Martin(2006:123)	'Competitive advantage implies that companies are able to satisfy customer needs more effectively than other competitors".	Valid ☒ Reliable ☒ No figurative language ☒ Not a vicious circle ☑	
3	Porter (1985:3)	"Competitive advantage grows fundamentally out of value a firm is able to create for its buyers that exceeds the firm cost of creating it. "	Valid ☒ Reliable ☑ No figurative language ☑ Not a vicious circle ☑	Porter (1985) definition of competitive advantage is invalid according to Routio's (2009) criteria as it ignores the competitors' existence in his definition. Moreove this definition of CA defines CA by its sources "grows fundamentally out of…"
14	Mooney (2007:112)	"competitive advantage: is a capability or resources that is difficult to imitate and valuable in helping the firm outperform its competitors"	Valid ☑ Reliable ☑ No figurative language ☑ Not a vicious circle ☑	A valid definition of quality can be deduced from these definitions as a 'achieving above average performance as compared to the firm competitors'. This extracted definition of competitive advantage is valid according to Routio's (2009) criteria because the definition match the concept (do not define CA by its sources, or ignore the competitors in the definition); clear (no figurative language included); and reliable (can be measured).
2	Day (1984:36).	"The outward evidence of competitive advantage is positional superiority, based on some combination of differentiation, cost superiority, or operating in a protected niche"	Valid ☑ Reliable ☑ No figurative language ☑ Not a vicious circle ☑	

7	Hill and Jones (1998)	“Competitive advantage means the firm has gained above-average returns as compared to its competitors in its industry”	Valid Reliable No figurative language Not a vicious circle	
8	Flint(2000:125)	“Competitive advantage is gains, benefits, or profits that accrue to a firm through the process of competition”.	Valid Reliable No figurative language Not a vicious circle	
12	Fitzroy and Hulbert (2005:201)	“A business has a competitive advantage when it is able to utilize its resources and competences to generate a value-creating strategy that other firms find difficult to imitate”.	Valid Reliable No figurative language Not a vicious circle	
11	Marcus (2005:3)	Competitive advantage “is above average performance in an industry”.	Valid Reliable No figurative language Not a vicious circle	

Appendix 4: Dimensional structure of QM in the literature review

Author / title	Industry /sample	Uni-dimensional	Multidimensional	Methods	Assumption Confirmed?	
					Yes	No
1- Saraph et al. (1989) *An Instrument For Measuring The Critical Factors Of Quality management.*	162 manufacturing and service industries.		Assumption 8 dimensions.	SPSS Alpha value and principal component analysis for each QM dimension separately to indicate the strength of the relationship of the individual items to its assumed dimension.	Confirmed the unidimensionality of each single practice of QM.	The structural dimension of the QM construct itself is untested.
2- Flynn, et al. (1994) *A framework for quality management research and an associated measurement instrument.*	716 respondents at 42 USA manufacturing industries.		Assumption 7 dimensions.	PCA and alpha value Assume that it is a multidimensional construct and used the principal component analysis and alpha value to indicate the strength of the relationship of the individual items to its assumed dimension.	Confirmed the unidimensionality of each single practice of QM.	The structural dimension of the QM construct itself is untested.
3- Flynn, et al. (1995) *The impact of quality management practices on performance and competitive advantage.*	42 companies 128 respondents.		Assumption 8 dimensions.	PCA and alpha value Assumed that QM is multidimensional construct and used the principle component analysis and alpha value to indicate the strength of the relationship of the individual items to its assumed dimensions.	Confirmed the unidimensionality of each single practice of QM.	The structural dimension of the QM construct itself is untested.
4- Powell (1995) *TQM as competitive advantage: a review and empirical study.*	54 USA firms (Manufacturing and services).		Assumption 12 dimensions.	Correlation analysis and alpha value for reliability.	Not tested	

5- **Ahire et al. (1996)** *Development and validation of TQM implementation constructs.*	371 Manufacturing firms.		Assumption 12 dimensions.	SPSS(EFA) LISREL and SEM (CFA) Assume that QM is a multidimensional construct and used EFA to refine its dimensions and then used CFA where, CFI value more than 0.9 for each single dimension used as a proof of the unidimensionality.	Confirmed.	
6- **Easton and Jarrell (1998)** *The effect of total quality management on corporate performance: empirical investigation.*	108 Firms.	Assumption those companies who obtained a quality certificates.			Not tested.	
7- **Grandzol and Gershon (1998)** *A survey instrument for standardizing TQM modeling research.*	275 from aerospace, tooling, and engineering industries.		Assumption 8 dimension	Assume that it's a multidimensional construct and used alpha value for reliability test and factor analysis (PCA and CFA) for construct validity.	No statistical evidence to proof if QM could be a multidimensional or a unidimensional construct.	
8- **Dow et al. (1999)** *Exploding the myth: Do all quality management practices contribute to superior quality performance.*	*698 manufacture* firms.		Assumption 9 dimensions.	SPSS(EFA) LISREL and SEM (CFA) Assume that it is a multidimensional construct and used EFA (PCA) to refine the constructs and then used CFA for all the QM dimensions together to test its goodness of fit.	Confirmed.	
9- **Rao et al. (1999)**	780		Assumption	SEM	Confirmed the	The structural

A framework for international quality management research: development and validation of measurement instrument.	manufacturing and service firms.		13 dimensions.	LISREL CFA for each dimension (GFI more than 0.9 /RMR less than 0.05 values for each dimension). CFA was used as a proof of the unidimensionality of each single practice of the 13 practices which form the QM construct.	unidimensionality of each single practice of QM.	dimension of the QM construct itself is untested.
10- Agus and Sagir (2001) *The structural relationships between total quality management, competitive advantage and bottom line financial performance: An empirical study of Malaysian manufacturing companies.*	30 Malaysia Manufacturing firms.		Assumed it is a multidimensional construct but in the model used it as a single dimension measured by some indicators (quality management practices).		Not tested.	
11- Douglas and Judge (2001) *Total quality management implementation and competitive advantage: The role of structural control and exploration.*	229 USA service firms.		Assumption 7 dimensions.	PCA was employed to test the multidimensional assumption of QM and then used the average of each construct and run PCA again to find out that it represented one latent construct and finally used the average of that construct in the final model.		Assumption not supported.
12- DE CERIO (2003) *Quality management practices and operational performance:*	965 manufacture firms		Assumption 5 dimensions	SPSS Alpha value and principle component analysis were used to indicate the	Confirmed the unidimensionality of each single practice of QM.	The structural dimension of the QM construct itself is untested.

empirical evidence for Spanish industry				strength of the relationship of the individual items to its assumed dimension		
13- Kaynak (2003) *The relationship between total quality management practices and their effects on business performance.*	214 manufacture firms.		Assumption 6 dimensions	Used the principal factor analysis to indicate the strength of the relationship of the individual items to its assumed dimension and then used confirmatory factor analysis for construct validity.	Confirmed the unidimensionality of each single practice of QM.	The structural dimension of the QM construct itself is untested.
14- Conca et al. (2004) *Development of a measure to assess quality management in certified firms.*	106 ISO 9000 Certified firms.		Assumption 10 dimensions.	SPSS Alpha value and principal component analysis. principle component analysis and alpha value were used to indicate the strength of the relationship of the individual items to its assumed dimension.	Confirmed the unidimensionality of each single practice of QM.	The structural dimension of the QM construct itself is untested.
15- Prajogo, and Brown (2004) *The Relationship Between TQM Practices and Quality Performance and the Role of formal TQM program: an Australian empirical study.*	194 Manufacture firms.		Assumption 6 dimensions but in SEM analysis used all the dimensions as indicators of one latent construct (TQM).	Used the CFA as a data reduction method and to test validity using the CFI value more than 0.9 and alpha value for reliability.		Assumption not supported in SEM analysis used all the dimensions were used as indicators of one latent construct (TQM).
***16-* Prajogo and Sohal (2004)** *The multidimensionality of TQM practices in determining quality and innovation performance — an empirical examination.*	194 middle/senior managers in Australian firms.		Assumption 6 dimensions.	Used the CFA as a data reduction method and to test validity using the GFI value and alpha value for reliability Assume it is a multi-dimensional	Confirmed .	

				construct and divided the whole six dimension in three groups using the mean value of each dimension and related the three groups to a higher order construct forming a second order CFA to test the multidimensionality of the QM construct. Then in the full model used the three groups to test its correlation with the innovation performance.		
17- Kaynak and Hartley (2005) *Exploring quality management practices and high tech business performance.*	382 high tech firms.		Assumption 8 dimensions.	Used cluster analysis for the entire model not to test the dimensionality of the study constructs.		Assumption not confirmed. Did not find the individual dimension to improve the business performance , hence concluded that it should be a unidimensional to obtain some positive results (QM can improve the business performance).
18- Sila and Ebrahimpour (2005) *Critical linkages among TQM factors and business performance.*	220 USA manufacture firms.		Assumption 7 dimensions.	Used the CFA to confirm the unidimensionality of each QM dimension using measures such as CFI, RMSEA, Factor loading, Chi square cut off points and alpha value.	Confirmed.	

19- Lakhal, et al. (2006) *Quality management practices and their impact on performance*	133 Manufacturing firms.		Assumption 3 main dimensions.	SPSS: Principal factor analysis and confirmatory factor analysis (factor loading only for each dimension).	Confirmed the unidimensionality of each single practice of QM.	The structural dimension of the QM construct itself is untested.
20- Barker and Emery(2006) *The Effect of TQM factors on financial and strategic performance: An empirical test using manufacturing firms.*	257 manufacturing firm.		Assumption 8 dimensions.	CFA for construct validity Alpha value for reliability test.		Assumption not supported. Assume that QM is multidimensional construct with eight dimensions and then used a composite average score of each dimension to form eight variables and then used one composite score of these eight variables.
21- Feng et al. (2006) *The impact of TQM practices on Performance A comparative study between Australian and Singaporean organizations*	252 responses, 194 from Australia and 58 from Singapore		Assumption 6 dimensions were used to measure QM practices based on the Malcolm Baldrige National Quality Award (MBNQA) criteria.		Not tested.	
22- Dinh et al. (2006) *The impact of total quality management on innovation Findings from a developing country*	222 ISO certified companies Vietnam.		11 dimensions Assumption used it as a unidimensional (with the mean of each construct) once and a multidimensional once (with the mean of each construct).		Not tested.	

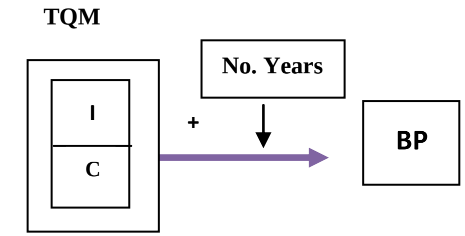
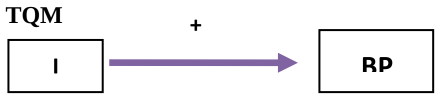
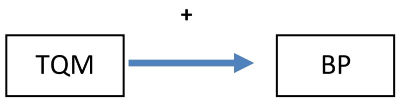
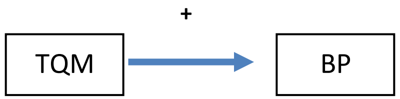
23- Prajogo and Sohal (2006) *The relationship between organization strategy, total quality management (TQM), and organization performance—the mediating role of TQM.*	194 middle/senior managers from Australian firms.		assumption 6 dimensions.	Employed PCA as a data reduction method for each dimension and used CFA to test each single construct validity.		Assumption not supported. Assume that QM is multidimensional construct with 6 dimensions and then used a composite average score of each dimension (after running PCA) to form six variables measuring one latent construct.
24- Tarı et al. (2006) *The relationship between quality management practices and their effects on quality outcomes.*	106 quality certified firms in Spain.		Assumption 9 dimensions.	Assume that it is a multidimensiuonal construct and used the principle component analysis and alpha value to indicate the strength of the relationship of the individual items to its assumed construct.	Confirmed the unidimensionality of each single practice of QM.	The structural dimension of the QM construct itself is untested.
25- Terziovski (2006) *Quality management practices and their relationship with customer satisfaction and productivity improvement.*	1341 manufacture firms (962 from Australian and 379 from New Zealand.		Assumption 6 dimensions.	Used the CFA as a data reduction method to remove any factor loading less than .45 for each dimension and then used the multiple regression to test the hypothesis.		Assumption not supported. Did not find the individual dimension to improve the business performance , hence concluded that it should be a unidimensional to obtain some positive results (QM can improve the business performance).

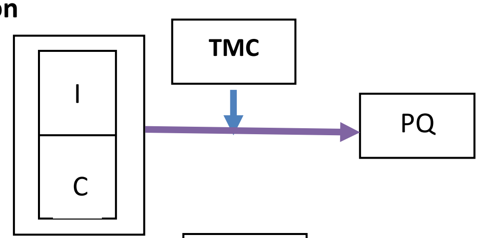
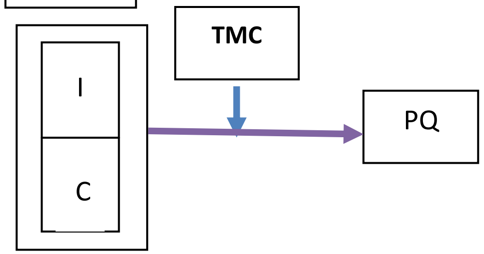
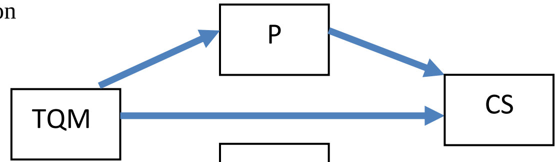
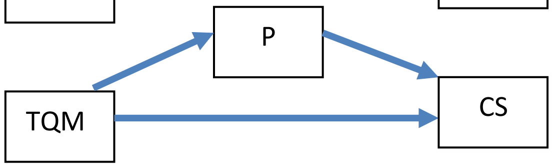
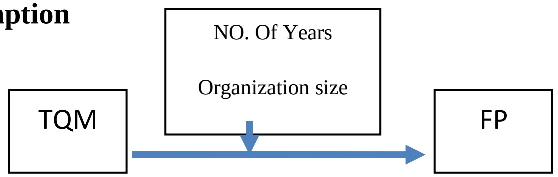
26- Mady (2008) Quality management practices An empirical investigation of associated constructs in two Kuwaiti industries.			Assumed 3 dimensions and PCA recommended 4.	SPSS Alpha value and principal component analysis were used to indicate the strength of the relationship of the individual items to its assumed dimension.	Confirmed the unidimensionality of each single practice of QM.	The structural dimension of the QM construct itself is untested.
27- Su et al. (2008) The impacts of quality management practices on business performance An empirical investigation from China.	196 Manufacturing and service firms in West China.		Assumption Eight dimensions.	PCA for each single dimension CFA for construct validity. Alpha value for reliability test.		Assumption not supported. Assume that QM is multidimensional construct with eight dimensions and then used a composite average score of each dimension(after running PCA) to form eight variables measuring one latent construct.
28- Zu et al. (2008) The evolving theory of quality management:The role of Six Sigma	226 US manufacturing plants.		Multidimensional	EFA and CFA.	Confirmed.	
29- Zu (2009) Infrastructure and core quality management practices: how do they affect quality.	226 USA manufacturing firms.		Assumption 7 dimensions related to two main dimensions (Infrastructure 7, core 3)	Used the CFA to confirm the unidimensionality of each QM dimension using CFI measure.	Assumes that QM is a multidimensional construct and used CFA to confirm the unidimensionality of each dimension	The structural dimension of the QM construct itself is untested.

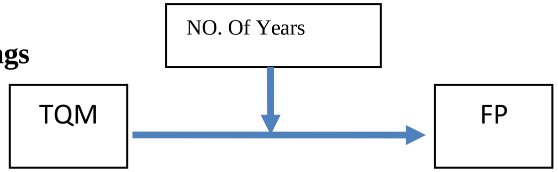
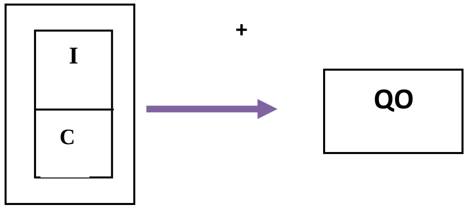
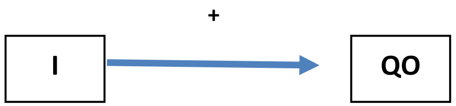
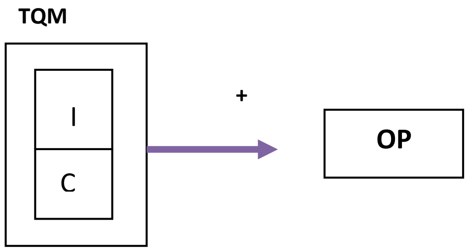
Appendix 5: Direct and indirect relationships between quality management practices (QMPs) and their outomes, including business performance, quality perofrmance , and competitive advanateg (literature review)

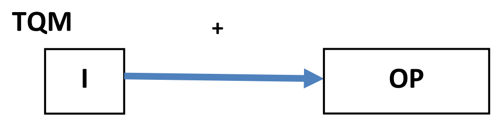
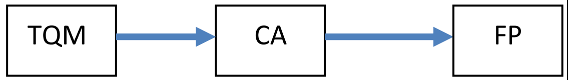
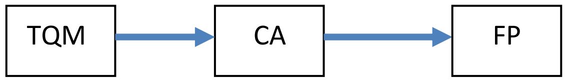
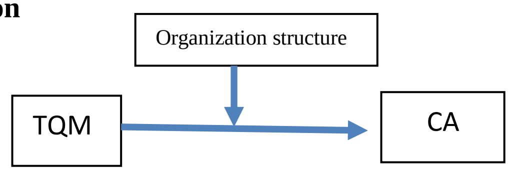
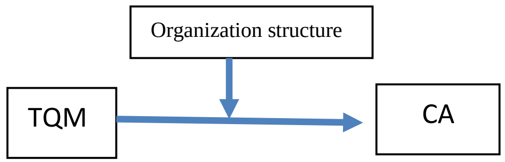
QMPs were categorized into two groups in the below table: “infrastructure” (I) and “core” (c) QMPs to simplify the review and the picturing of the previous studies framework. However, this classification is not adopted in the current study because core QMPs as first coined by Flynn et al., (1995) are based on tools and techniques specifically and directly related to quality performance such as product/service design; Process management, quality data and reporting, while, the infrastructure quality management practices such as (top management leadership; employee management; customer focus; supplier focus; quality planning) create the environment that supports effective use of the core quality management practices. These definitions implied that some set of combined QM practices should be implemented together to form what is called core QMPs and some other combined set of QMPs should be implemented together to form the infrastructure QMPs, however, this assumption contradict several finding of the previous studies (see details in the below Appendix) where, individual quality management practices can be employed to obtain competitive advantage. Moreover, this definitions implied that the infrastructure QMPs should be indirectly related to the quality performance through the core QMPs, however there is evidence from the previous empirical studies (as shown below) that some of the infrastructure QMPs (as Flynn et al.,1995 defined) can be directly related to the organization performance including financial performance, while some other core QMPs(as Flynn et al., 1995 defined) can be indirectly related to the organization performance including financial performance, ‘see Appendix 5’.

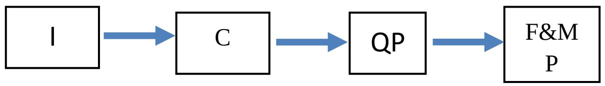
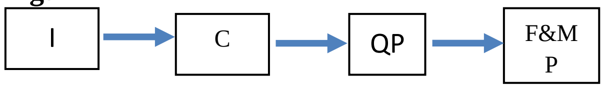
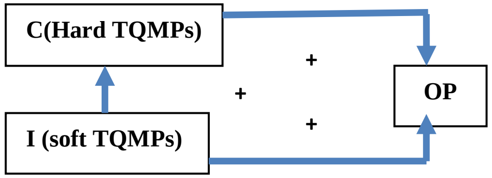
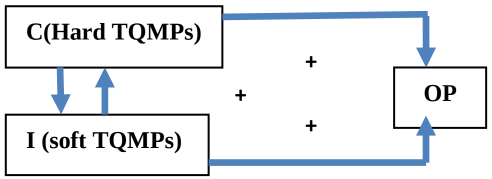
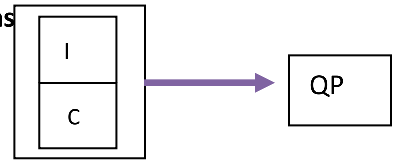
1-Study/ relationship investigated	2-QMp/TQM – performance/CA model	3-Findings	4-Responses and Methods
Flynn et al. (1995) QM with business performance and CA.	**Assumption** I $\xrightarrow{+}$ C $\xrightarrow{+}$ QP $\xrightarrow{+}$ CA **Findings** I $\xrightarrow{+}$ C $\xrightarrow{+/\_}$ QP $\xrightarrow{+}$ CA	• Top management support, supplier relationship, workforce management, and work attitudes infrastructure QM practices have a positive direct influence on product design process, statistical control and feedback, and process management core QM practices. • product design process, and process management core QM practices have a direct relationship with QP (perceived quality market outcomes and percent passed final inspection with no rework) • product design process has a direct positive relationship with the perceived quality market outcomes(QP indicator), while process management has a negative direct relationship with both the perceived quality market outcomes and percent passed final inspection with no rework (QP indicator)	42 USA manufacturing firms. Path analysis.

		• QP (perceived quality market outcomes and percent passed final inspection with no rework) was found to has a direct relationship with CA (measured by some perceptual variables related to unit cost of manufacturing; fast delivery; flexibility to change; inventory turnover; and cycle time) • R^2 indicated that QMPs explained slightly over a third in the variance in competitive advantage.	
Powell (1995) TQM with CA.	**Assumption**  **Findings**  	• Executive commitment, open organization, and employee empowerment TQM (infrastructure) practices are positively associated with business performance (measured by perceptual variables addressing profitability, sales, growth, and overall financial performance) as an indicator of competitive advantage. While training (infrastructure), benchmarking, flexible manufacturing, process improvement, and improved measurement (core) TQM practices were not associated with business performance. • Long-time TOM adopters were more satisfied with their TQM programs than short-time adopters even though no significant difference in the business performance between long and short-time adopters. In other words, TQM success appears to depend critically on several infrastructure practices and less upon core practices.	54 USA Manufacturing and service firms. Correlation analysis.
Hendrcks and Singhal (1997) TQM with BP	**Assumption**  **Findings**  	TQM measured by owning a quality award) was found to have a significant impact on business performance (measured by the change in operating income over the last six years).	34 firms that owning a quality a ward Creating a control sample as a benchmarking and comparing other firms to it.

Ahire and O'Shaughnessy (1998) TQM with performance(product quality).	**Assumption**  **Findings** 	Firms that have high commitment from top management regards quality implement the other (nine) TQM practices (customer focus, supplier quality management, design quality management, employee training, employee empowerment, employee involvement (infrastructure QM practices), and benchmarking, SPC, internal quality information usage (core QM practice) more effectively than those with low top management commitment. • In firms with high top management commitment, variations among the other nine TQM implementation constructs do not affect product quality significantly. • In firms with low top management commitment, four of the nine TQM constructs, namely, customer focus, empowerment, internal quality; supplier quality management (infrastructure) and information usage (core), are primary predictors of product quality.	449 manufacturing plants (respondents: plant managers) Stepwise multiple regression.
Choi and Eboch (1998) TQM practices, plant performance, and customer satisfaction.	Assumption   Findings	The results provide evidence that suggest relations between TQM practices, plant performance, and customer satisfaction. TQM was found to have a strong positive and significant direct imapct on customer satisfaction (was measured by three perceptual factors: quality (product reliability, technical innovation, rapid design change, conformance to specification); cost (cost-reduction, capability, low price for customer); delivery, (consistent delivery, short delivery lead time and rapid volume changes). moreover, TQM was found to have an indirect positive (but weak) relationship with the customer satisfaction through the plant performance (was measured by three perceptual factors: quality(production down time, external reject, internal reject); delivery (on-time delivery, flow time, machine cycle time); cost (costs per units produced, work-in-process, inventory, weeks of raw materials supply, inventory turnover ratio)	339 manufacturing companies (respondents: plant managers). Structural equation modelling.
Easton and Jarell (1998) TQM with performance	**Assumption** 	The findings indicated that performance (measured by both accounting variables and stock returns) was improved for the firms adopting TQM, furthermore, the improvement was consistently stronger for firms with more advanced TQM system only while the organization size ; owning a quality award and downsizing did not affect the relationship between TQM and performance..	108 firms. Creating a control sample as a

	Findings 		benchmarking and comparing other firms to it.
Dow et al. (1999) Various QM practices with business performance	**Assumtion**  **Findings** 	workforce management, shared vision, and customer focus infrastructure QM practices all together have a positive relation with quality outcomes as an indicator of the business performance which was measured by single perceptual construct contains indicators related to: The percentage of defects at final assembly, The cost of warranty claims, The total cost of quality, An assessment of the defect rate relative to competitors. Conversely, other ‘‘hard’’ quality practices, such as benchmarking, advanced manufacturing technologies (core), and close supplier relations, cellular work teams (infrastructure) do not contribute to superior quality outcomes. *In other words, several infrastructure QM practices(but none of the core practices) were significantly related to the quality outcomes.*	698 Australian manufacturing firms. Structural equation modelling.
Samson and Terziovski (1999) TQM with business performance	**Assumtion** 	• Leadership, staff management and customer focus TQM (infrastructure) practices were the strongest significant predictors of the business performance, while, strategic quality planning (infrastructure), information and analysis and process management (core) practices did not significantly affect the business performance. • business performance was measured by perceptual factors related to customer satisfaction, employee morale, productivity, Defects as a percentage of production volume ,Warranty claims cost as a percentage of total sales , Cost of quality (error, scrap, rework inspection) as a percentage of total sales, Delivery in full on time to our customer. *In other words, several infrastructure TQM practices(but none of the core practices) were significantly related to operational performance*	1024 Australian and New Zealand manufacturing firms. Multiple regression analysis.

	Findingd 		
Agus and Sagir (2001) TQM and competitive advantage	Assumption  Findings 	The findings of the study suggested that TQM practices (as a single construct contains: top management commitment, customer focus, supplier focus, and employee focus) have an indirect impact on financial performance (was measured by some perceptual indicators related to total assets ,net profit ,and turnover per employee) through competitive advantage (was measured by two factors: industry factors (barriers to entry and rivalry/competition); and differentiation factors(product differentiation, personnel differentiation and price/cost differentiation). TQM has a strong effect on competitive advantage which ultimately leads to a more significant impact on financial performance. Finally, however, several dimensions of TQM are examined; a single TQM construct is employed to analyze the relationship between TQM and financial performance	30 Malaysia manufacturing firms. Structural equation modelling.
Douglas and Judge (2001) TQM and CA.	**Assumption**  **Findings** 	TQM was found to have a positive direct relationship with CA (measured by the business performance compared to its competitors. The business performance was measured by perceived financial performance over the last three years such as Growth in earnings; Growth in revenue; Changes in market share; Return on assets; Long-run level of profitability). Moreover this relationship was strengthened by the organization structure. In this study, several dimensions of TQM are tested; however, a single TQM construct is employed to analyze the relationship between TQM and competitive advantage	229 USA service firms. Regression analysis.

Kaynak (2003) TQM and business performance.	**Assumption**  **Findings** 	The business performance was measured by three perceptual indicators related to quality performance (productivity, cost of scrap and rework as a percentage of sales, delivery lead-time of purchased materials); financial and market performance (return on investment, profit growth , market share , market share growth, Sales growth); and Inventory management performance (purchase material turnover, total inventory turnover). Process management and product/service design core quality management practices were found to have a direct positive effect on quality performance and indirect effect on financial and market performance through quality performance. While , all the infrastructure quality management practices (management leadership, supplier management, employee relations, training) and quality data &reporting (core) were found to have indirect positive relationship with quality performance through process management and product/service design core quality management practices.	214 USA manufacturing and service firms. Structural equation modelling.
Rahman and Bullock (2005) Soft and hard TQM with organizational performance.	**Assumption**  **Findings** 	• Five out of six soft (infrastructure) TQM elements were found to have a positive direct relationship with organizational performance (measured by the same indicators used by Samson and Terziovski, 1999 mentioned previously). These are Workforce commitment, Shared vision, Customer focus, Use of teams, and Cooperative supplier relations. In addition to this direct relationship, Soft (infrastructure) TQM also has an indirect effect on performance through its effect on hard (core) TQM. • Three out of four elements of hard(core) TQM—Use of JIT principles, Technology utilization, and Continuous improvement enablers—were found to have significant relationships with all six soft(infrastructure) TQM elements(Workforce commitment, Shared vision, Customer focus, Use of teams, and Cooperative supplier relations, personnel training). • Use of JIT principles; Technology utilization and Continuous improvement hard (core) TQM practices were found to have direct relationship with business performance.	261 Australian manufacturing firms. Simple regression analysis.
Prajgo and Brownl (2004) TQM and quality performance.	**Assumption** **TQM & non TQM firms** 	Leadership ; customer focus and people management (infrastructure) quality management practices has shown a strong correlation with quality performance (measured be perceptual indicators related to reliability, performance, durability, conformance to specification) among non- TQM firms, on the other hand among TQM firms information and analysis; process management (core) quality management practices combined with the strategic planning(infrastructure) were the stronger predictor of the quality performance. Therefore, the study demonstrated that it is more importance for the organization to seriously	194 Australian manufacturing firms. Structural equation modelling.

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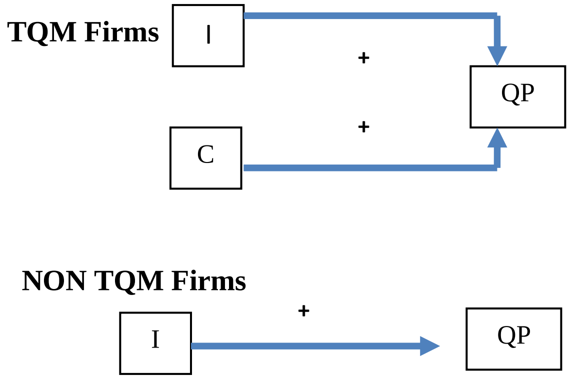
<td>Findings

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<td>implement TQM principles as a set of practices rather than simply establishing TQM program.
TQM was operationalized as a uni dimensional construct in this study contains six QM praactices (leadership, strategic planning, customer focus, information & analysis, people management, and process management).</td>
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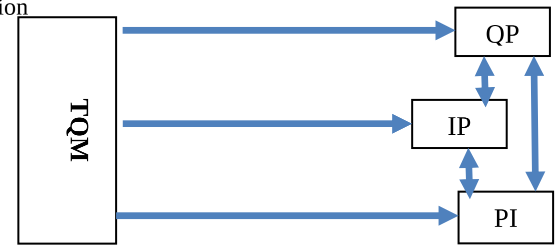
<td>Prajogo and Sohal (2003) TQM with quality performance ; innovation performance ; and Process innovation.</td>
<td>Assumption


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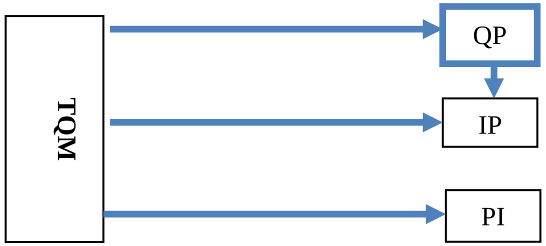
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<td>The findings suggested that TQM practices (as a uni dimensional construct) significantly and positively relates to product quality (measured by perceptual indicators related to reliability, performance, durability and conformance to specification), product innovation (measured by perceptual variables related to the level of newness/novelty of new products, the use of latest technological innovation, in new product development, the speed of new product development, the number of new products introduced to the market, and the number of new products that is the first to the market) and process innovation (measured by perceptual variables related to the technological competitiveness, the update-ness or novelty of technology used in process, the speed of adoption of the latest technological innovation in the process, the rate of change in process, techniques, and technology), although it appears that the magnitude of the relationship is greater against the quality performance. Additionally, positive significant causal relationships are found between quality performance and innovation performance.</td>
<td>194 Australian manufacturing firms.

Structural equation modelling.</td>
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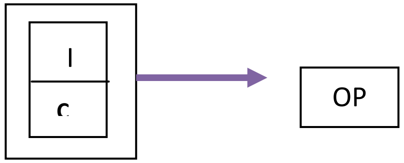
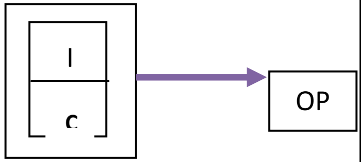
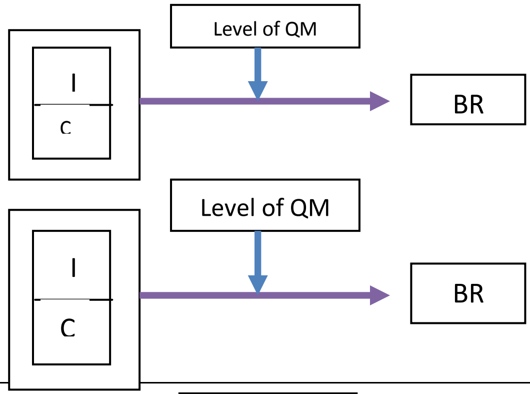
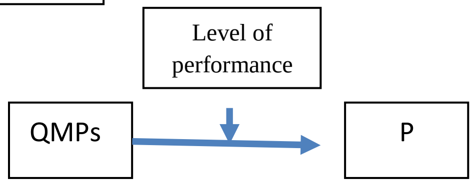
Merino-Díaz (2003) Various quality management practices and business performance.	**Assumption**  **Findings** 	Quality management practices such as product design and development (core), together with practices related to human resource such as involvement, empowerment, training (infrastructure), are the most predictors of operational performance (measured by perceptual indicators related to cost, quality and time).	965 Spanish manufacturing firms. Multiple regression analysis.
Lau et al. (2004) Quality management and business performance.	Assumption Findings 	The results provide an evidence that that companies adopting total quality management are found to have best business performance (measured by some perceptual indicators related to customers; employees satisfaction; product quality; profitability; and productivity) as compared to companies that adopt only inspection or those that practice only statistical quality control (the firm level was identified by asked the firms to assign themselves to be one of three stages of quality management: Inspection ,Statistical quality control ,or Total quality management). Moreover, the results indicate and supporte the common wisdom that firms adopting a formal total quality management have best performance in several dimensions such as leadership, customer and market focus,s trategic planning, information and analysis, human resource, compared to firms that practice only inspection or those that practice only statistical quality control. in this study, several dimensions of TQM are employed; however, a single TQM construct is used to test the relationship between TQM and business performance.	600 Chinese firms (452 manufacturing firms and 148 service firms) (respondents: quality managers. Factor analysis.
Kaynak and Hartley (2005) management practices and techniques with	**Assumption** 	The study tested the relationship between the extent of quality management implementation and business performance in high tech manufacturing companies. The results indicated that QMPs are extensively implemented in high performing (the performance was measured by 2 perceptual indicators: 1- Quality performance- product/service quality, productivity, cost of scrap and rework as percent of sales, and delivery lead time of finished product/services to customer- ;	103 USA manufacturing firm. Cluster analysis.

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performance.</td>
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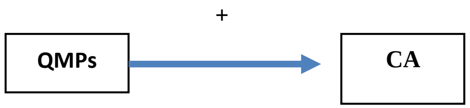
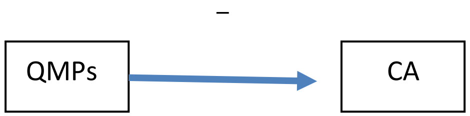
Findings

High business performance firms compared to low business performance firms



QMPS can be a source of CA

Low business performance firms compared to High business performance firms



QMPS can not be a source of CA

</td>
<td>2- Financial and market performance - sales growth, market share, and market share growth) firms more than low performing high tech firms. Thus, QMPs can be considered as a source of competitive advantage for high tech firms.</td>
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<td>Sila and Ebrahimpour (2005)

TQM factors and business performance.</td>
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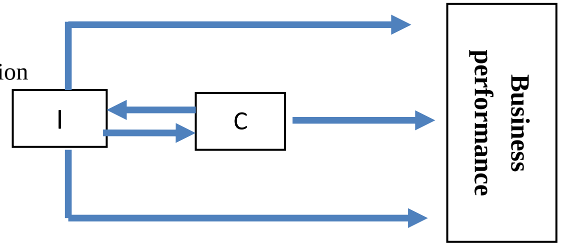
Assumption



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<td>Leadership (infrastructure) and information and analysis (core) have strong implications for a company's business performance (measured by some perceptual indicators related to human resource results; financial and market results; organization effectiveness results). In other words, the effective use of QM practices that are related to these factors is likely to improve performance. Leadership has direct and indirect imapcts on business results through human resource management and process management. However, information and analysis is the only practice that has an indirect effect on business performance through human resource management and process management. Thus, other than leadership, process management is the only practice that has a direct imapct on business results.</td>
<td>220 USA manufacturing firms.

Structural equation modelling.</td>
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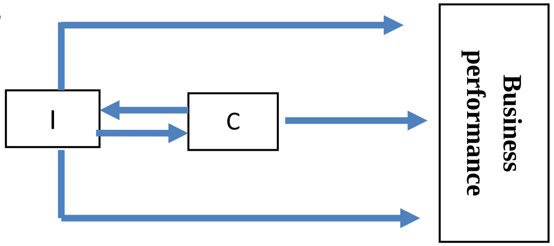
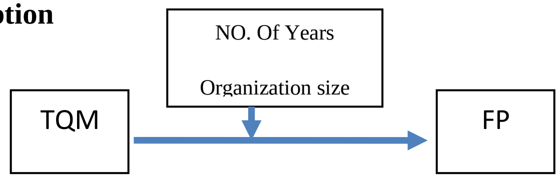
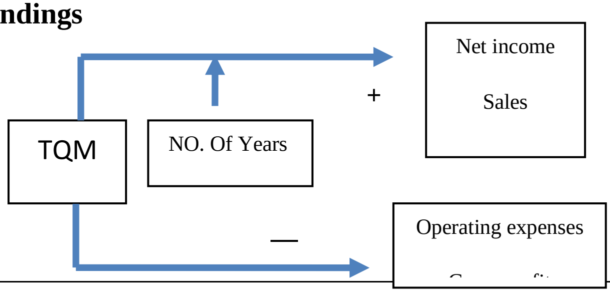
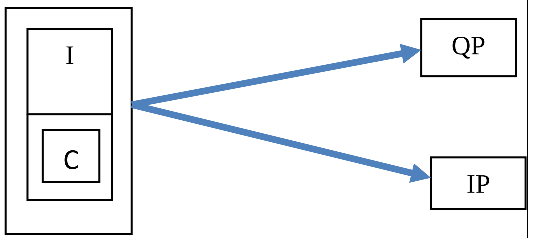
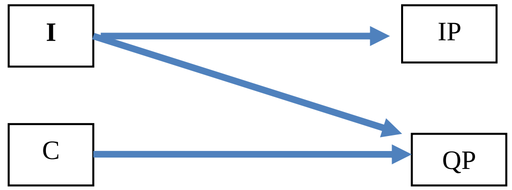
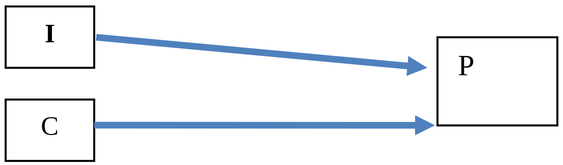
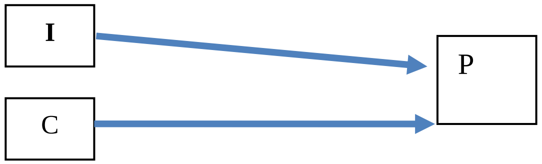
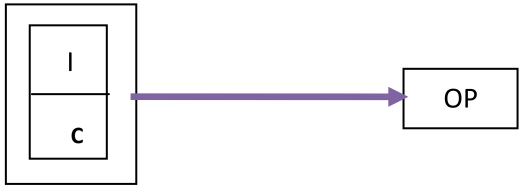
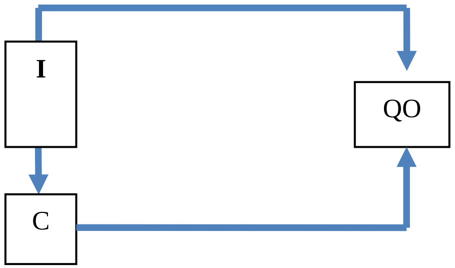
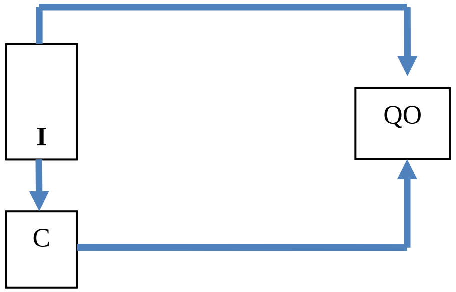
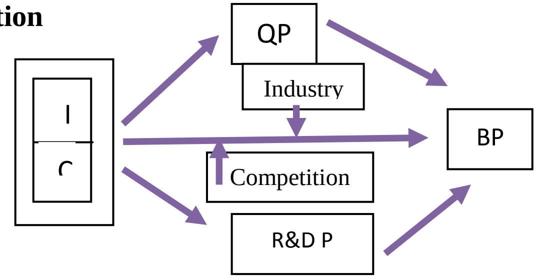
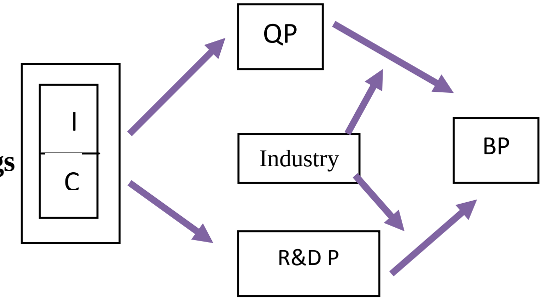
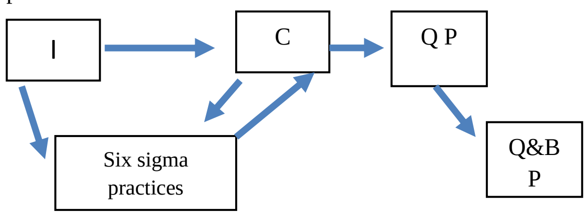
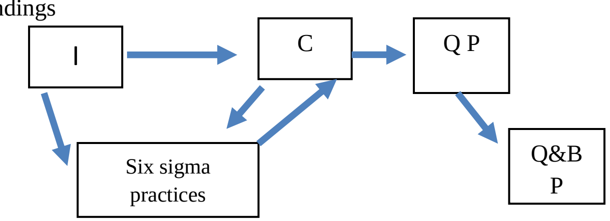
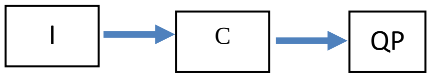
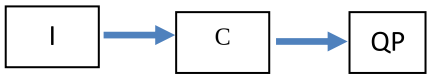
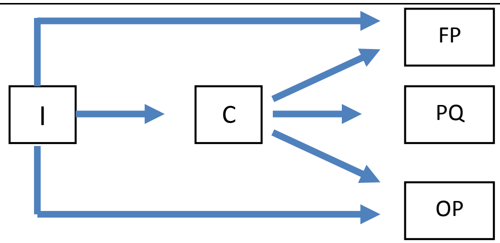
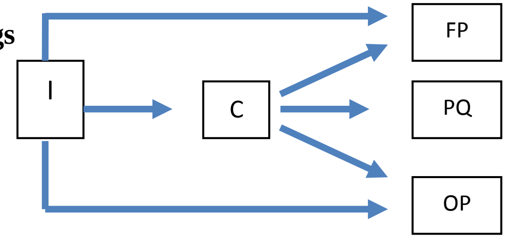
	Findings 		
Barker and Emery (2006) TQM and financial performance.	**Assumption**  **Findings** 	• The aggregate TQM practices - as a single construct - were found to be positively correlated with several financial performance indicators (change in: net income, sales and customer satisfaction). While, the aggregate TQM variable was found to be negatively correlated with: operating expenses, and gross profit margin. • The findings also suggested that the impact of the TQM variables on performance is highly strengthened by the duration of adoption.	257 USA manufacturing firm. Confirmatory Factor Analysis.
Feng et al. (2006) TQM practices on performance.	Assumption 	Six constructs were used to measure TQM practices in organizations based on the Malcolm Baldrige National Quality Award (MBNQA) criteria, namely leadership, people management, customer focus, strategic planning (infrastructure), and process management, information and analysis (core). The results of the study indicated that. relatively more organic dimensions such as leadership and people management (infrastructure) are related more to innovation performance (was measured by some perceptual variables related to the number of innovations, the speed of innovation, the level of innovativeness (novelty or newness), latest technology used, and being the "first" in the market), whilst more mechanistic dimensions such as customer focus (infrastructure) and process	252 responses, 194 from Australia and 58 from Singapore. Structural equation

	Findings 	management (core) are significantly related to quality performance (was measured by using some perceptual indicators related to reliability, performance, durability and conformance to specification.	modelling.
Fening et al. (2008) QM and performance	Assumption  Findings 	Six dimensions were used to measure TQM practices in organizations based on the Malcolm Baldrige National Quality Award (MBNQA) criteria, namely leadership, people management, customer focus, strategic planning (infrastructure), and process management, information and analysis (core). Fening et al. (2008) found a positive relationship between all the QM dimensions investigated (except the information and analysis) with some other different level of performance (customer satisfaction, employee morale and market share).	200 manufacturing and service firms in Ghana. Multiple regression analysis.
Terziovski (2006) TQM with business performance.	Assumption 	The study investigated the relationship between TQM practices (leadership, customer focus, people management, strategic planning, infrastructure practices and information & analysis and process management core practices) with the business performance (measured by perceptual indicators related to productivity and customer satisfaction). The major finding of the study was that multiple quality management practices when implemented simultaneously have a significant and positive effecte on the business performance (productivity improvement and customer satisfaction).	962 responses from Australian manufacturing firms and 379 responses from New Zealand manufacturing firms. Multiple regression

	Findings 		analysis.
Tarı´et al. (2007) Quality management practices on quality outcomes.	**Assumption**  **Findings** 	• Leadership infrastructure QM practice was found to have a direct positive effect on quality planning; human resource management; customer focus; supplier management; and learning QM infrastructure practices. Moreover, human resource management; customer focus; and supplier management infrastructure QM practice were found to have a direct positive effect on process management infrastructure QM practices. • Quality planning, learning; and process management infrastructure QM practices were found to have a positive direct effect on continuous improvement core QM practice. • Human resource management (infrastructure) and continuous improvement (core) were found to have a direct positive effect on the quality outcomes (measured be some perceptual indicators related to financial results, profitability, revenue, and competitive position), while leadership, customer focus, supplier management , quality planning, and learning (infrastructure), and quality techniques &tools and process management(core) were found to have positive indirect relationship with the quality outcomes through continuous improvement core quality management practice.	106 certified firms in Spain. Path analysis.

Su et al. (2008) quality management practices on business performance.	**assumption**  **Findings** 	• The direct link between QMPs (customer focus and satisfaction; employee training; leadership and top management commitment; cross-functional quality teams; employee involvement; continuous improvement and innovation (infrastructure practices); quality information and performance measurement; and statistical process control (core practices) and business performance (sales growth; market share; and growth in market share) was not supported • QMPs was found to be indirectly related to business performance through two variables: quality performance (the percentage of defects at final assembly; product quality; durability; reliability; and delivery on time) and R&D performance (mistakes rate of design; R&D time; R&D competency; R&D costs). • Industrial type was found to be a moderator to the relationships between QMPs and business performance (the positive impact of the QMPs on performance in manufacturing firms is more than its impact in service firms), while not enough evidence was found to to support the moderating effect of competition between QMPs and business performance. • In this study, several dimensions of QMPs are tested; however, a single QMP construct is employed to discover the relationship between QM and business performance.	196 Manufacturing and service firms in West China. Structural equation modelling.
Zu et al.(2008) Six sigma and QM with quality and business performance.	Assumption 	The study revealed that the three untraditional QMPs (he called it Six Sigma practices) (measured by perceptual indicators related to Six Sigma structured, improvement procedure, and Six Sigma focus on metrics) are distinct practices from traditional quality management practices (infrastructure and core QMPs), and that they complement the traditional quality management practices in improving quality performance (measured by perceptual indicators related to cycle time, cost of scrap and rework, customer satisfaction, and delivery) and then business performance (measured by perceptual indicators related to sales, market share, operating income, profits, and return on assets) through its effect on the quality	226 US manufacturing firms. Factor analysis.

	Findings 	performance.	
Zu et al. (2009) Infrastructure and core quality management practices and quality performance.	Assumption  Findings 	The results of the model shows that the core QM (quality information, product / service design, and process management) directly improve the quality performance (measured by perceptual indicators related to cycle time, cost of scrap and rework, customer satisfaction, and delivery), while, the infrastructure QM (top management support, customer relations, supplier relations, and workforce management) contributes to improve quality performance indirectly through supporting the core QM.	226 manufacturing firms in USA. Structural equation modeling (SEM)
Lakhal (2009) QMPs with performance.	**assumption** 	• The results indicated a direct significant imapct of "top management commitment and support" infrastructure practice on the following quality management infrastructure practices: "organization for quality" "employee training" "employee participation" and "customer focus". • The results provided an evidence that indicated a direct effect of all the infrastructure QM practices (top management commitment and support, organization for quality, employee training, employee participation, supplier quality management, customer focus, continuous support) on operational performance (measured by perceptual variables related to waste level; productivity; cycle time) and of core practices (information and analysis, quality system improvement) on product quality (measured by perceptual variables related to reliability, durability, tenacity, and regularity), while organization for quality" and "customer focus" (infrastructure practices) have a positive significant direct imapct on financial performance (measured by perceptual variables related to Return on investments, Return on assets, Sales growth), whereas, "information and analysis" core practice have a positive significant direct imapct on both operational and financial performance. In contrary, the "quality system improvement" core practice does not have a	133 Tunisian manufacturing Firms. Path analysis.

	Findings 	positive significant direct imapct neither on operational nor on financial performance. • Moreover, the “information and analysis” and the “quality system improvement” core practices were found to have a positive significant direct imapct on product quality. • Finally the infrastructure QMPs have indirect imapct on the operational, financial performance, and product quality through the core quality management practices.	

BP: business performance

BR: Business results

B&O P: Business and operational performance.
C: Core QMPS

CA: competitive advantage

CF: Customers Focus

EM: Employee Management

FP: financial performance

F&M P: Financial and marketing performance

JIT: Just in time

I: Infrastructure QMPs

IP: innovation performance

OP: operational performance

P: Performance

PCA: principal component analysis

PI: Product innovation

PM: Process Management

PQ: product quality

PS : perceived service

QD&R: Quality Data and Reporting

QM: quality management

QMPs: quality management practices

QO: Quality outcomes

QP: quality performance

R&D: research and development

R^2 : squared factor loading

RBV: resource based view

ROA: return on assets

ROE: returns on equity

ROI: return on investment

SEM: structural equation modelling

SM: Supplier Management

SPSS: Statistical Package for Social Sciences

TMC: Top Management Commitment

TML: Top Management Leadership

TQM: total quality management

Appendix 6: Quality management practices investigated in the previous empirical studies on the relationship between quality management and business performance/competitive advantage between: 1989-2010.

Some of the below QMPs are combined together because either the indicators which employed to measure these practices are very similar, or some of these practices is the responsibility of another, in other words same QM indicators are used with different titles.

		TML		EM								PM														
	Author (s)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**Industry type/sector**	**Country**
1	Abraham et al., (1999)	x	x	x	x	x	x	x	x	x					x							x			x	winners of quality awards firm in manufacturing/ service sectors	Australia
2	Adam , 1994	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x		x	x			x		Manufacturing sector	USA
3	Adam et al., (1994)	x	x		x	x	x	x	x	x		x	x	x	x		x	x		x						Manufacturing sector	Korea, New Zealand & USA
4	Adam et al., (1997)	x	x	x	x	x		x	x	x			x		x	x	x		x					x		Manufacture/ service sectors	Asia/South Pacific, Europe, & North America
5	Agus & Abdullah (2000)	x			x			x				x	x	x	x	x							x	x		Manufacturing sector	Malaysia
6	Agus and Sagir, (2001),	x		x											x			x								Manufacturing sector	Malaysia
7	Agus (2000)	x		x	x	x			x			x		x	x	x			x							Manufacturing sector	Malaysia
8	Ahire(1996)	x			x	x	x		x				x	x	x	x	x	x								motor vehicle parts sector	USA
9	Ahire&O'Shaughnessy(1998)	x			x	x	x						x	x	x	x	x									auto parts sector	USA
10	Ahire et al., (1996)	x			x	x	x						x	x	x	x	x	x	x							manufacturing	USA
11	Anderson& Sohal(1999)	x	x	x	x	x	x	x	x	x		x		x	x	x	x	x	x			x	x		x	small/medium-sized manufacturing/ service sectors	Australia
12	Anderson et al., (1995)	x	x	x	x		x	x	x	x		x		x	x	x		x	x						x	Manufacturing sector	USA

13	Askey& Malcolm (1997)	x							x				x	x	x	x							x		x	Advertising sector	UK
14	Badri et al., (1995)	x			x	x			x			x	x	x		x	x									Manufacture/ service	UAE
15	Barker and Emery, (2006)	x																								Manufacture sector	USA
16	Batley (1993)	x													x				x	x						Manufacturing sector	New Zealand
17	Batley (1999)	x			x		x	x	x	x	x	x		x	x	x		x	x			x	x		x	Manufacturing sector	New Zealand
18	Beattie&Sohal(199)	x						x	x				x	x	x				x				x		x	ISO certified firms	Australia
19	Beaumont and Schroeder (1997)							x							x	x		x					x	x	x	Manufacturing/ service sectors	Australia
20	Benson et al.,(1991)	x			x	x				x		x		x	x	x	x		x		x					Manufacture/ service	USA
21	Bilich& Neto (2000)	x	x	x	x	x				x			x	x		x		x				x			x	Banks sector	Brazil
22	Birch& Pooley (1995)	x			x										x		x			x	x					Manufacturing sector	Russia
23	Black& Porter (1996)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x		x	x	x		x	Manufacturing / service sectors	Europe
24	Breiter& Kline (1995)	x			x	x	x	x		x		x		x	x	x			x			x			x	Hotels sector	USA
25	Brookshaw& Terziovski(1997)	x	x	x					x		x	x		x	x	x		x	x			x				Manufacturing sectors	Australia
26	Brown& Van der Wiele,(1996)																						x			ISO certified firms	Australia
27	Camison (1996)	x	x	x	x	x		x		x	x	x			x	x	x		x			x			x	Hotels sector	Spain
28	Carter (2000)			x	x	x	x		x	x		x		x	x				x					x	x	manufacturing	USA
29	Chan & Ho. (1997)	x	x		x				x			x		x	x				x			x			x	Healthcare sector	USA & Canada
30	Chapman et al., (1997)	x	x			x			x			x		x	x	x			x						x	manufacturing	Australia
31	Chaudhry et al., (1997)	x	x		x				x				x		x	x						x			x	food industry sector	USA

32	Chen & Paetsch (1997)	x										x	x	x			x								x	Manufacturing sector	USA
33	Cheng& Chan (1999)	x		x	x	x		x	x	x		x	x	x	x	x	x		x			x			x	Technological sector	China
34	Choi and Eboch(1998)																									Manufacturing sector	USA
35	Cooper 1998)	x	x						x			x										x			x	Manufacturing sector	USA& Europe
36	Corbett & Rastrick, (2000)	x	x	x	x	x	x			x		x		x	x	x			x						x	manufacturing	New Zealand
37	Crosby& LeMay (1998)	x				x	x		x			x		x	x				x							motor carrier services	USA
38	Curkovic et al., (2000)	x			x		x		x				x	x	x	x			x							Automotive supply	USA
39	Das et al. (2000),	x	x		x	x	x	x	x			x	x	x	x	x	x	x	x		x				x	manufacturing	USA& Europe
40	Douglas& Glen (2000)										x												x			ISO certified firms	UK
41	Douglas and Judge (2001)	x			x								x	x	x	x					x					manufacturing	USA
42	Dow et al., (1999)	x	x		x	x	x	x	x		x		x	x	x			x	x	x				x	x	manufacturing	Australia
43	Dunbar (1992)	x	x		x					x				x	x	x	x		x			x				Healthcare	Japan; Canada: Germany: USA
44	Easton and Jarrell (1998)		x		x	x			x	x		x	x	x	x		x	x	x	x			x	x		Manufacture/ service	USA
45	Ebrahimpour & Withers(1992)		x			x							x								x			x		Manufacturing	USA
46	Feng et al.,(2006)	x	x	x								x			x	x										Manufacture/ service	Australia/Singapore
47	Fening et al., (2008)	x	x	x								x			x	x										Manufacture/ service	Ghana
48	Fletcher (1999)	x	x	x	x	x	x	x	x	x		x		x	x	x		x							x	Service	South Africa
49	Flynn& Schroeder, (1997)	x		x								x	x	x	x		x							x		manufacturing	USA

50	Flynn et al., (1994)	x	x	x	x				x	x		x	x	x	x	x	x	x	x			x		x	x	manufacturing	USA
51	Flynn et al., (1995)	x	x	x		x	x	x	x	x		x	x	x	x		x	x	x						x	manufacturing	USA
52	Forker (1997)	x			x	x			x	x		x	x	x	x	x	x	x		x	x				x	electronic	USA
53	Forker, & Hershauer, (2000)	x			x	x						x	x	x	x	x	x				x		x		x	manufacturing	USA
54	Golhar et al., (1997),	x			x	x		x																		Motor vehicle	USA/Canda
55	Gore (1999)	x	x		x	x	x		x	x	x	x	x	x	x	x	x	x	x	x		x			x	manufacturing	Luxemburg
56	Hasan and Kerr(2003)	x	x										x		x		x	x								Service	Australia
57	Grandzol (1998)	x	x		x	x	x	x	x		x	x	x	x	x	x	x		x	x						Baldrige quality winner	USA
58	Hendricks& Singhal,. (1996)	x	x		x	x				x		x	x	x	x	x			x	x	x				x	quality award winner	USA
59	Hendricks& Singhal, (1997)	x								x					x	x			x		x					quality award winner	USA
60	Ho et al., (1995)	x			x	x			x	x					x				x	x					x	Manufacture/ service	UK/Japan
61	Ho& Fung (1995)	x	x		x	x			x	x	x	x	x	x	x	x			x	x			x		x	Quality assurance registered firms	Japan
62	Ismail& Hashmi (1998)												x	x	x									x		manufacturing	Ireland
63	Kaynak(2003)	x		x								x				x		x								Manufacture/ service	USA
64	Kaynak and Hartley, (2005)	x		x	x							x			x	x	x	x								Manufacture	USA
65	Kim, et al., (1997)								x					x	x	x		x			x				x	Manufacture	Worldwide
66	Krasachol et al. (1998),	x			x		x		x				x		x								x	x		ISO certified firms	Thailand
67	Kuei& Madu (1995)	x			x	x		x	x	x	x	x		x	x	x	x									Manufacture/ service	Taiwan
68	Kuei et al. (1997)	x		x	x	x	x	x	x	x		x		x		x	x									Manufacture	Taiwan
69	Lakhal et al. (2006)	x			x		x							x	x	x		x								manufacture	Tunisia
70	Lau et al.(2004)	x	x	x										x	x	x										Manufacture/ service	China

71	Lee (1998)																							x		manufacture	Korea
72	Lee& Palmer (1999)	x			x									x	x								x		x	Manufacture/ service	New Zealand
73	Lee et al. (1999	x																								Manufacture	Hong Kong
74	Lee et al. (1999)	x			x	x		x	x	x		x	x	x	x		x		x	x	x		x		x	Manufacture/ service	Hong Kong
75	Li (1997)	x		x	x							x		x	x	x	x	x	x						x	hospital	USA
76	Longo& Cox (2000)	x	x		x		x	x	x					x	x	x	x		x			x	x		x	Financial services	UK
77	Luzon (1993)	x	x	x	x				x				x		x	x	x	x						x		Manufacture/ service	Spain
78	Madu& Kuei (1995)	x		x	x	x		x		x		x		x	x	x	x		x							Manufacture	USA &Taiwan
79	Macinati (2008)	x	x	x								x				x		x					x			National Health Service	Italia
80	Martı´nez-Costa et al., (2009)	x		x								x			x	x	x	x								Manufacture	Spain
81	Martensen et al. (2000)	x	x												x				x						x	Manufacture/ service	Denmark
82	Merino-Díaz, (2003) ,			x								x	x		x		x	x								Manufacture	Spain
83	Millen et al. (1999)	x	x		x				x				x	x	x	x		x			x	x				logistics	Australia
84	Molina et al. (2007)								x				x		x			x			x					Manufacture/ service	Spain
85	Morita & Flynn (1997)	x	x	x	x	x		x	x	x		x	x	x	x	x	x		x					x	x	Manufacture	Japan
86	Muntinga, and Cruywagen (2006)	x				x						x		x	x	x		x					x			architectural	South African
87	Dahlgaard-Park et al., (2001)		x		x	x		x					x			x		x								Auto assembler	Koria
88	Porter& Parker (1993),	x	x	x	x	x			x			x	x	x	x	x	x		x			x	x		x	Manufacture	UK
89	Powell (1995),	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x		x	x	Manufacture/ service	USA
90	Power& Sohal (2000)	x	x	x	x	x	x	x	x	x			x	x	x			x	x	x				x	x	Manufacture	Australia

91	Prabhu&Robson (2000),	x	x	x	x	x						x		x	x		x	x	x		x					Manufacture/ service	England
92	Prajogo and Brownl, (2004),	x	x	x								x			x	x										Manufacture	Australia
93	Prajogo and Sohal, (2004)	x	x	x						x					x	x										Manufacture/ service	Australia
94	Prajogo and Sohal, (2006)	x	x	x								x			x	x										Manufacture	Australia
95	Rahman, (2001),	x	x	x								x			x	x	x									Manufacture/ service	Australia
96	Rahman and Bullock, (2005),	x		x					x					x	x	x		x						x		Manufacture	Australia
97	Rao et al., (1997)	x	x	x	x		x					x		x	x	x			x	x			x			Manufacture/ service	India; China; Mexico
98	Rao et al., (1999a)	x	x	x	x	x		x			x			x	x	x	x			x						Manufacture/ service	USA/Taiwan/ India; China; Mexico
99	Rao et al.,(1999b)	x	x	x	x	x	x	x		x				x	x	x			x	x			x			Manufacture/ service	India; China; Mexico
100	Sadikoglu and Zehir(2010)	x	x	x								x		x	x	x		x								Manufacture/ service	Turkey
101	Samson& Ford (2000)	x	x	x	x			x	x			x		x	x			x	x				x	x	x	Manufacture	Australia &new Zeeland
102	Samson& Parker (1994)		x	x									x			x	x	x	x						x	service	Australia
103	Samson& Terziovski, (1999)	x	x	x	x	x	x	x			x	x		x	x	x		x	x			x			x	Manufacture	Australia &new Zeeland
104	Saraph et al., (1989)	x		x	x	x			x	x		x	x	x		x	x		x		x				x	Manufacture/ service	USA
105	Sila and Ebrahimpour(2005)	x	x	x	x			x			x	x	x	x	x	x	x	x								Manufacture	USA
106	Sohal (1994)		x		x				x			x		x	x	x		x							x	Manufacture	Australia/UK
107	Sohal (1998),	x	x	x	x	x		x	x	x		x	x	x	x	x	x		x	x	x	x			x	Manufacture	Australia
108	Sohal et al., (1996),	x	x		x		x			x				x	x	x	x						x		x	service	Australia
109	Sohal and	x	x	x	x	x		x	x	x			x	x	x	x		x	x				x		x	Manufacture	Australia

	Terziovski (2000)																										
110	Su et al., (2008)	x			x	x			x				x	x	x	x										Manufacture/ service	China
111	Sun (1999),	x	x	x	x	x		x			x			x	x	x				x			x			Manufacture/ service	Norway
112	Sun (2000a),	x	x	x	x				x	x	x	x		x	x	x			x	x			x			Manufacture	Norway/shan ghai
113	Sun, (2000b),	x	x	x	x			x			x			x	x	x				x			x			Manufacture/ service	Norway
114	Sussan, & Johnson, (1996)	x										x			x	x									x	computers	USA
115	Tamimi,&Sebasti-anelli(1996)	x						x	x				x		x	x	x		x	x					x	Manufacture/ service	USA
116	Tamimi & Sebastianelli(1998)	x	x	x	x				x			x	x	x			x		x				x		x	Manufacture/ service	USA
117	Tan, et al.,(2000),	x	x										x				x	x	x							Manufacture	USA
118	Tarı´et al., (2007),	x	x	x	x							x		x	x			x								Manufacture/ service	Spain
119	Taylor, W.A. (1997),	x	x			x			x			x		x	x	x			x	x			x			Manufacture/ service	Ireland
120	Taylor, W.A. (1998), "	x	x		x	x	x	x						x	x	x			x	x			x		x	Manufacture/ service	UK
121	Terziovski, & Dean (1998),	x	x	x	x	x	x	x			x	x		x	x	x	x		x							Service	Australia
122	Terziovski, et al.,(1997)	x	x		x	x	x		x			x	x	x	x	x	x		x			x	x			ISO certified firms	Australia &new Zeeland
123	Terziovski, et al.,(2006)	x	x	x								x			x	x										Manufacture	Australia &new Zeeland
124	Zehir, and Sadikoglu (2010)	x				x						x		x	x			x	x				x			ISO certified firms	Turkey
125	Zu et al.,(2008)	x		x								x			x	x	x	x								Manufacture	USA
126	Zu et al.,(2009)	x		x								x			x	x	x	x								Manufacture	USA
127	Zu(2009)	x		x								x			x	x	x	x								Manufacture	USA
	Total	112	69	61	79	58	34	41	58	40	26	73	53	83	107	89	54	50	59	24	19	22	32	19	52		

1- Top management leadership (TML).
2- Strategic planning (SP).
3- Human resource management (HRM)
4- Training (T).
5- Employee involvement (EI)
6- Employee empowerment (EE).
7- Employee satisfaction (ES).
8- Teamwork (TW).
9- Employee appraisal, rewards, and recognition (EARR).
10- Social responsibility (SR) (includes environmental control, security and safety of employee, customers and communities and other related issues).
11- Process management (PM).
12- Process control (PC).
13- Continuous improvement and innovation (CII).
14- Customer focus n (CF).
15- Quality data & Reporting
16- Product and service design (PSD).
17- Supplier management (SM)
18- Quality assurance (QA) (the term is used in various contexts in the literature, but in this study, it is used to describe a "preventive rather than a corrective" approach to problem solving suggested by TQM).
19- Zero defects (ZD).
20- Quality culture (QC).
21- Communication (C).
22- Quality systems (QS) (mostly issues involving ISO 9000).
23- Just in time (JIT).
24- Flexibility (F)

Appendix 7: Initial finding concerning the quality management practices and its descriptions (literature review)

QM practices(dimensions/factors)	Description(indicators)	Studies
Top Management leadership	Acceptance of quality responsibility by top management. Evaluation of top management on quality. Participation by top management in quality improvement efforts. Specificity of quality goals. Importance attached to quality in relation to cost and schedule. (Saraph et al., 1989:818)	Adam et al. (1997), Ahire et al. (1996), Ahire and O'Shaughnessy (1998), Anderson et al. (1995), Black and Porter (1996), Crosby (1984), Deming (1986), Douglas and Judge (2001), Feigenbaum (1982), Flynn et al. (1994), Garvin (1988), Grandzol and Gershon (1997), Juran (1986), Powell (1995), Rungtusanatham et al. (1998), Samson and Terziovski (1999), Saraph et al. (1989), Wilson and Collier (2000), Agus and Sagir (2001), Rahman, (2001), Kaynak (2003), Prajogo and Brownl (2004), Kaynak and Hartley (2005, Malcolm Baldrige Award (Criteria for Performance Excellence, 2005), Barker and Emery (2006), Prajogo and Sohal (2006), Su et al. (2008)
Employee Training	Provision of statistical training, trade training, and quality-related training for all employee(Saraph et al., 1989:818)	Adam et al. (1997), Ahire et al. (1996), Anderson et al. (1995), Crosby (1984), Das et al. (2000), Deming (1986, 1993), Douglas and Judge (2001), Dow et al. (1999), Easton and Jarrell (1998), Feigenbaum (1982), Garvin (1988), Grandzol and Gershon (1997), Juran (1986), Powell (1995), Rungtusanatham et al. (1998), Saraph et al. (1989), Wilson and Collier (2000), Agus and Sagir (2001), Ho et al. (2001), Rahman (2001), Kaynak (2003), Kaynak and Hartley (2005), Malcolm Baldrige Award (Criteria for Performance Excellence, (2005), Rahman and Bullock (2005), Barker and Emery (2006).
Employee relations	Implementation of employee involvement and quality circles. Open employee participation in quality decisions. Responsibility of employee for quality. Employee recognition for superior quality performance. Effectiveness of supervision in handling quality issues. Ongoing quality awareness of all employee (Saraph et al., 1989:818)	Adam et al. (1997), Ahire et al. (1996), Black and Porter (1996), Crosby (1984), Deming (1986, 1993), Dow et al. (1999), Easton and Jarrell (1998), Feigenbaum (1982), Flynn et al. (1994), Forza and Flippini (1998), Juran (1986), Kaynak (2003), Mohrman et al. (1995), Powell (1995), Samson and Terziovski (1999), Saraph et al. (1989), Wilson and Collier (2000), Das et al. (2000), Ho et al. (2001), Rahman (2001), Kaynak (2003), Kaynak and Hartley (2005), Malcolm Baldrige Award (Criteria for Performance Excellence, 2005), Barker and Emery (2006)
Customer focus	Customer involvement in product or service design. Use of customer satisfaction surveys. Focus on achieving greater customer satisfaction (Ahire et al., 1996; Powell, 1995)	Adam et al. (1997), Ahire et al. (1996), Black and Porter (1996), Deming (1986, 1993), Dow et al. (1999), Easton and Jarrell (1998), Feigenbaum (1982), Flynn et al. (1994), Forza and Flippini (1998), Garvin (1988), Grandzol and Gershon (1997), Mohrman et al. (1995), Powell (1995), Samson and Terziovski (1999), Wilson and Collier (2000), Das et al. (2000), Agus and Sagir (2001), Douglas and Judge (2001), Merino-Díaz,(2003), Kaynak (2003), Kaynak and Hartley (2005), Malcolm Baldrige Award (Criteria for Performance Excellence, 2005), Tarı´et al. (2007), Su et al. (2008).
Supplier quality management	Fewer dependable supplier. Reliance on supplier process control. Strong interdependence of supplier and customer. Purchasing policy emphasizing quality rather than price. Supplier quality control.Supplier assistance in product development (Saraph et al., 1989:818)	Ahire et al. (1996), Black and Porter (1996), Crosby (1984), Das et al. (2000), Deming (1986, 1993), Dow et al. (1999), Easton and Jarrell (1998), Feigenbaum (1982), Flynn et al. (1994), Forza and Flippini (1998), Garvin (1988), Juran (1986), Mohrman et al. (1995), Powell (1995), Saraph et al. (1989), Wilson and Collier (2000), Agus and Sagir (2001), Ho et al. (2001), Kaynak (2003), Merino-Díaz (2003), Kaynak and Hartley (2005), Rahman and Bullock (2005), Barker and Emery (2006), Tarı´et al. (2007).
Quality planning	We have a mission statement which has been communicated throughout the company and is supported by our employee, We have a comprehensive and structured planning process which regularly, sets and reviews short and long-term goals, Our organization focus on achievement of 'Best Practice', When we develop our plans, policies and objectives we always	Samson and Terziovski (1999), Prajogo and Sohal (2006), Tarı´et al. (2007).

	incorporate ,customer requirements, supplier capabilities, and needs of other stakeholders including the community, We have a written statement of strategy covering all manufacturing, operations which is clearly articulated and agreed to by our Senior Managers, Our site's manufacturing operations are effectively aligned with the central business mission, Results are evaluated by comparing them to planned results, in order to make improvements (Samson and Terziovski, 1999:406)	
Product/service design	Thorough scrub-down process. Involvement of all affected departments in design reviews. Emphasis on producibility. Clarity of specifications. Emphasis on quality, not roll-out schedule. Avoid frequent redesigns (Saraph et al., 1989:818	Adam et al. (1997), Ahire et al. (1996), Black and Porter (1996), Crosby (1984), Deming (1986, 1993), Easton and Jarrell (1998), Feigenbaum (1982), Flynn et al. (1994), Garvin (1988), Juran (1986), Saraph et al. (1989), Wilson and Collier (2000), Kaynak (2003), Malcolm Baldrige Award (Criteria for Performance Excellence, 2005), Kaynak and Hartley (2005).
Process management and improvement	Clarity of process ownership, boundaries, and steps. Less reliance on inspection. Use of statistical process control. Selective automation. Foolproof process design. Preventive maintenance. Employee self-inspection. Automated testing; This organization reinforces continuous study and improvement of all its products, services and processes (Saraph et al., 1989; Tarı et al., 2007)	Ahire et al. (1996), Anderson et al. (1995), Black and Porter (1996), Crosby (1984), Deming (1986, 1993), Feigenbaum (1982), Flynn et al. (1994), Forza and Flippini (1998), Grandzol and Gershon (1997), Juran (1986), Mohrman et al. (1995), Powell (1995), Rungtusanatham et al. (1998), Samson and Terziovski (1999), Saraph et al. (1989), Wilson and Collier (2000), Kaynak (2003), Merino-Díaz, (2003), Malcolm Baldrige Award(Criteria for Performance Excellence, 2005), Kaynak and Hartley (2005), Prajogo and Sohal (2006), Tarı´et al. (2007), Zu et al. (2008).
Quality data and reporting	Use of quality cost data. Feedback of quality data to employee and managers for problem solving. Timely quality measurement. Evaluation of managers and employee based on quality performance. Availability of quality data (Saraph et al., 1989:818)	Ahire et al. (1996), Black and Porter (1996), Crosby (1984), Deming (1986, 1993), Douglas and Judge (2001), Feigenbaum (1982), Flynn et al. (1994), Malcolm Baldrige Award (Criteria for Performance Excellence, 2005), Mohrman et al. (1995), Powell (1995), Samson and Terziovski (1999), Saraph et al. (1989), Wilson and Collier (2000), Ho et al. (2001), Juran (1986), Kaynak (2003), Lakhal (2009), Prajogo and Sohal (2006), Zu et al.,(2008)
Statistical process control	Charts showing defect rates are posted on the shop floor, charts showing schedule compliance are posted on the shop floor, (Flynn, 1995:690), cards and graphs are used to measure and control quality, and general management encourages the use of statistical methods. Statistical techniques are used intensively in the company, employee participate in training programs related to statistical techniques for quality, statistical techniques are effective at improving product quality (Lakhal et al., 2006:645)	Flynn et al. (1995), Ahire and O'Shaughnessy (1998), Lakhal (2009), Mady (2008), Su et al. (2008).

Source: Adopted from Kaynak and Hartley (2008); Saraph et al. (1989); Powell (1995); and several authors as mentioned in the table

Appendix 8: Questionnaire

Dear Hotel General Manager;

This questionnaire was designed to identify the quality management aspects that can improve the hotel financial performance; all the Egyptian hotels (around 1000) are invited to participate; your contribution will be appreciated; your answers will be kept strictly confidential and will be used only for research purposes. The analysis of the survey will involve statistical aggregates making the individual responses impossible to be identified within the study results. If you would like to receive a copy of the results of the study (which quality management practices can improve the hotel financial performance), please answer the last three optional questions. If you have any concerns about the conduct of this research project, please contact the Secretary, HUBS Research Ethics Committee, University of Hull, Cottingham Rd, Hull, HU6 7RX; Tel No (+44) (0)1482 463646; fax (+44) (0)1482 463689".

Section 1

1. **What is the star rating of your hotel?**

   1- * ☐ **2- **** ☐ **3- ***** ☐

   4- **** ☐ **5- ******* ☐

2. **In which area your hotel is located**?
   1. Greater Cairo ☐
   2. Sinai and Red Sea ☐
   3. South Egypt ☐
   4. Alexandria and Northern Coast ☐

3. **The hotel belongs to**

Chain ☐ Individual ☐

Section 2

Please identify how long the hotel has had the following quality management standard certification, where "0" means not certified

Certification(s)		Number of years
ISO 9001 certification		

Section 3

1- Please identify how long the hotel has implemented the following quality management practices, where, "0" means not applicable.

	Indicators/items	0	Number of years
1	**The hotel management provides the necessary financial resources to implement the quality management related practices**[9]		
2	**The hotel has an established quality planning process**[10]		
3	**The hotel results (such as average occupancy and average daily rate, market share overall revenue and cost) are evaluated by comparing them to planned results**		
4	**All hotel departments are involved in quality management related activities**		
5	**The hotel employees are training in statistical techniques (such as histograms and control charts, and regression analysis) is available for.**		
6	**The hotel held a monthly meeting for employee from different departments to discuss quality related suggestions.**		
7	**The hotel implements most employee s' quality related suggestions**		
8	**The hotel departments managers create a work environment that encourages employee to perform to the best of their abilities**		
9	**The hotel is in contact with customers to be updated about their requirements**		
10	**The hotel is in contact with customers to update them about the new product**[11]		

[9] Quality management practices: are these set of activities that are supposed to improve the quality performance and the hotel financial performance. Examples of such practices include: quality planning ; customer focus; supplier focus; process management; employee management with regard to quality; and some specific quality tools and techniques such as statistical process control tools -Run charts; Pareto charts and analysis; Cause-and-effect diagrams; Frequency histograms Control charts.

[10] Quality planning: Systematic process that translates quality policy into measurable objectives and requirements, and lays down a sequence of steps for realizing them within a specified time frame.

[11] Product: goods and services

11	**The hotel considers the customer requirements in the product design process**		
12	**The hotel top management study results of customer satisfaction surveys**		
13	**The hotel has an effective process for resolving customer complaints in a timely manner**		
14	**The hotel strives to establish long-term relationships with high reputation suppliers**		
15	**The hotel provides suppliers with a clear specification of the required products**		
16	**The hotel considers supplier capabilities in the product design process**		
17	**The hotel displays quality data (defects and errors rates; control charts) at most of the departments**		
18	**The hotel uses quality data to evaluate employee performance**		
19	**The hotel displays the progress towards quality related goals**		
20	**The hotel employees receive standardized instructions about their tasks**		
21	**The hotel uses statistical techniques**[12] **in order to reduce variance in processes**		
22	**The hotel uses preventive maintenance system** [13]		

2- How much weight do you put in the following quality management aspects?

Quality management practices	Weight/ 100
Top management leadership	
Employee management	
Customer focus	
Supplier management	
Quality data & reporting	
Process management	

[12] Statistical techniques: : such as : run charts, Pareto charts, Pareto charts and analysis, Cause and effect diagram, Frequency histogram control charts, Process capability studies.

[13] Preventive maintenance system: Conducted by the hotel employee to keep equipment working and/or extend the life of the equipment

Section 3

This section is concerned with the hotel financial performance. Please answer the following questions

What is the number of rooms in the hotel?

What is the number of the hotel's employee?

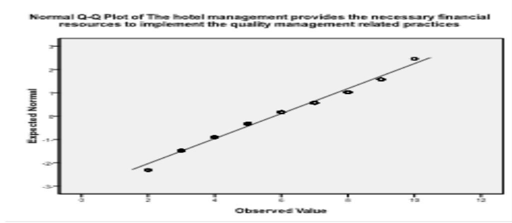
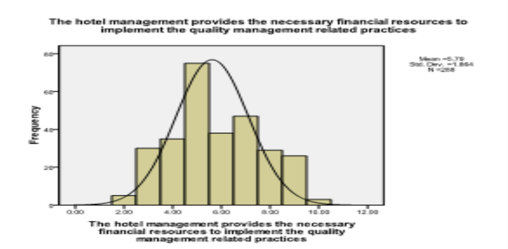
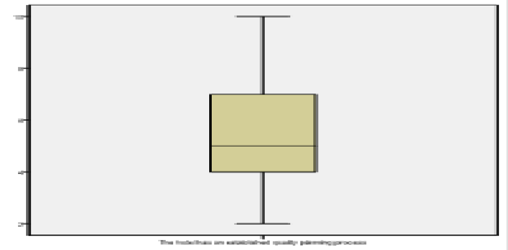
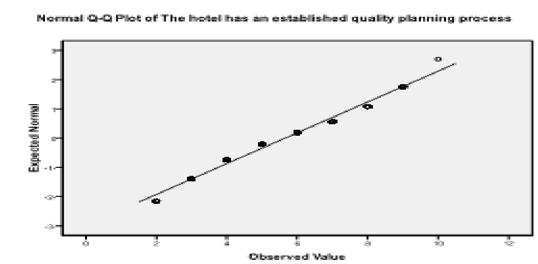
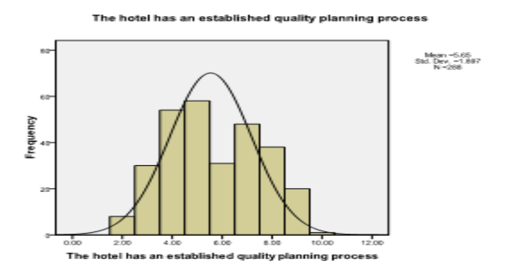
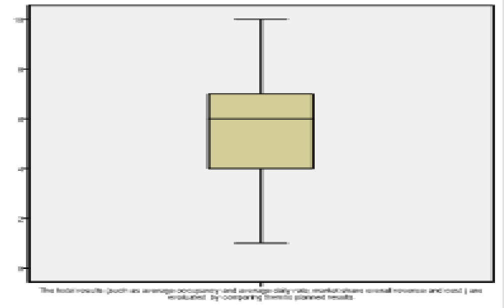
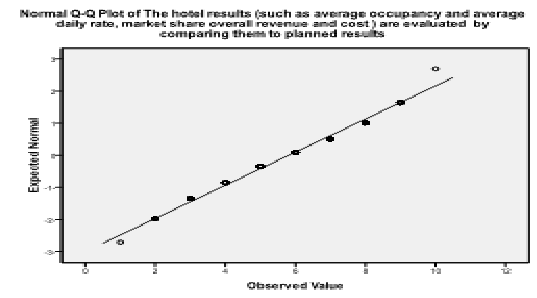
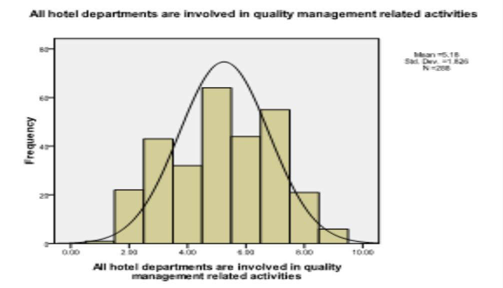
	2007	2008	2009
What was the hotel average occupancy in the following years?			
What was the hotel average room rate in the following years?			
What was the hotel turnover (revenue) in the following years'?			

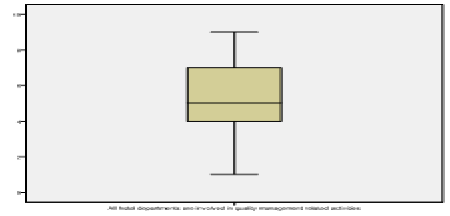
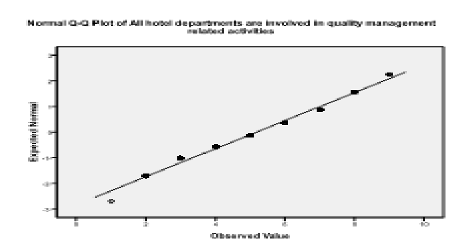
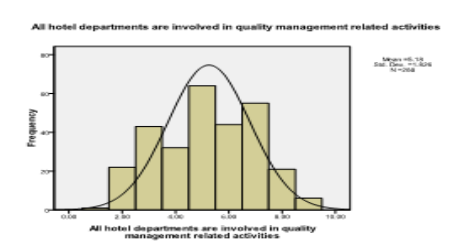
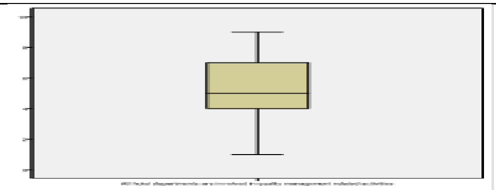
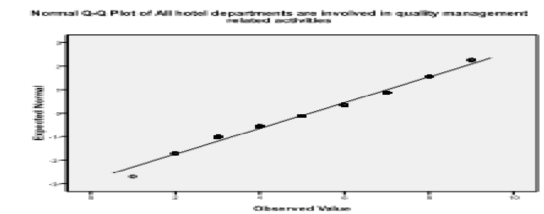
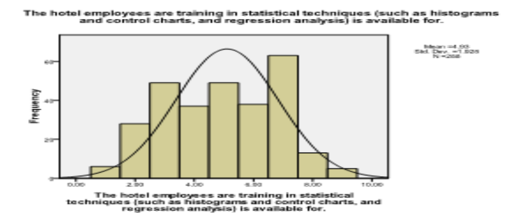
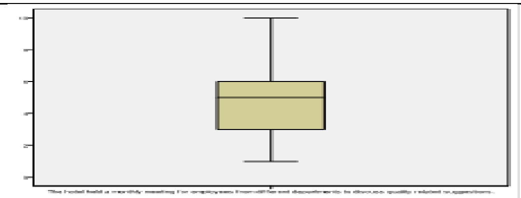
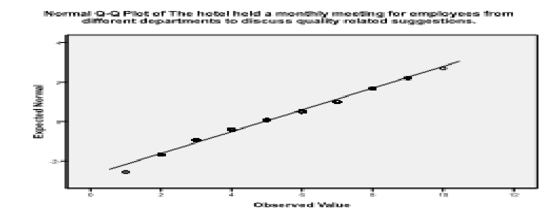
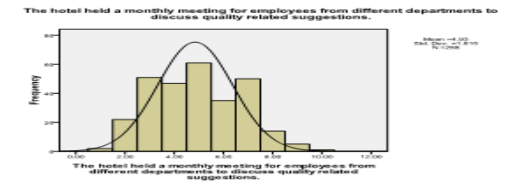
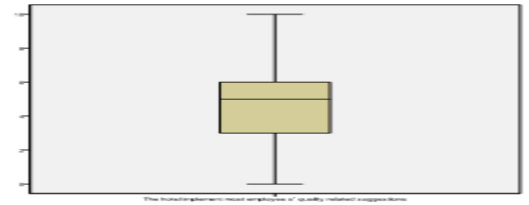
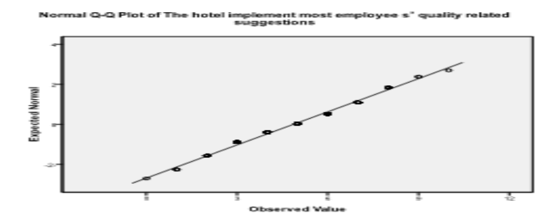
1. Optional question

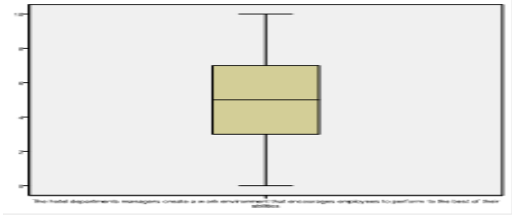
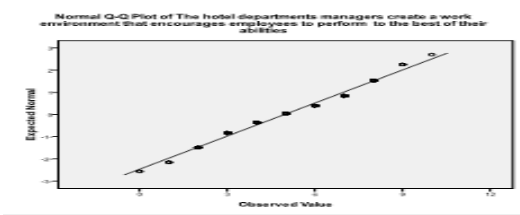
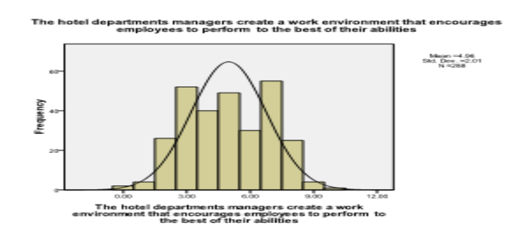
i- **What is the name of your hotel?**

ii- **What is the address of your hotel?**

Appendix 9: Different descriptive shapes for the research variables

	Boxplot	Normal Q-Q Plot	Histogram
Variables that measure top management leadership QMPs			
variable 1			
variable 2			
variable 3			

Variables that measure Employee Management QMPs			
Variable 4			
Variable 5			
Variable 6			
Variable 7			

Variable 8			
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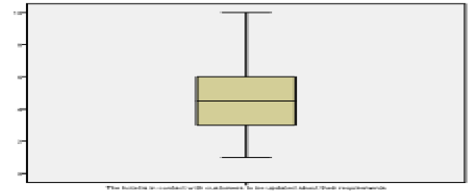
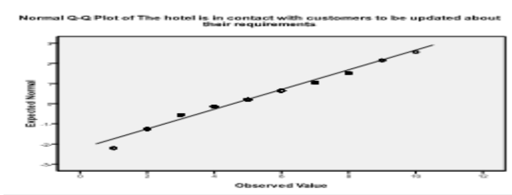
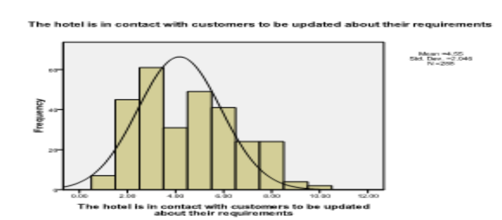
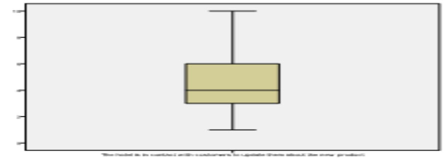
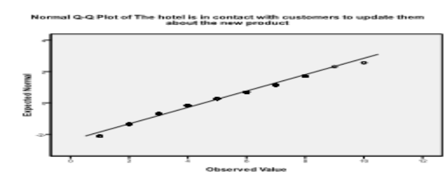
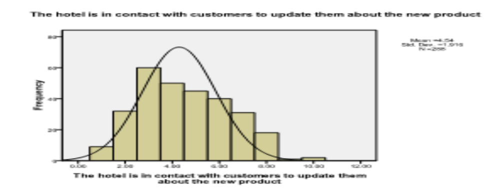
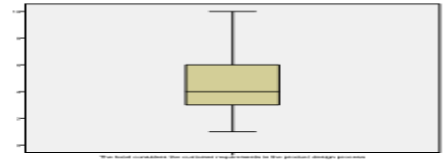
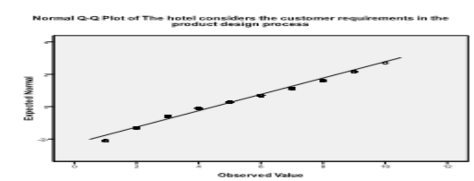
Variable 9			
Variable 10			
Variable 11			

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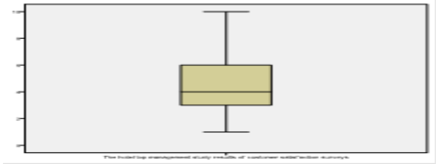
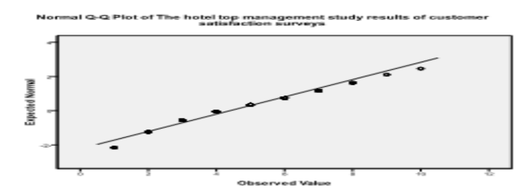
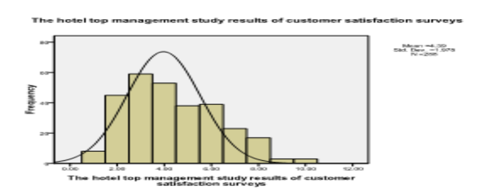
<tr><td>Variable 12</td><td></td><td>
</td><td>
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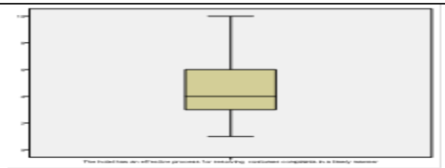
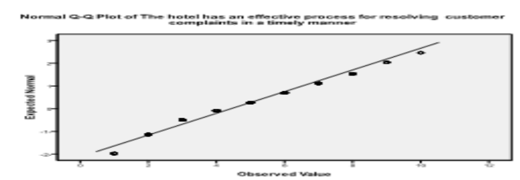
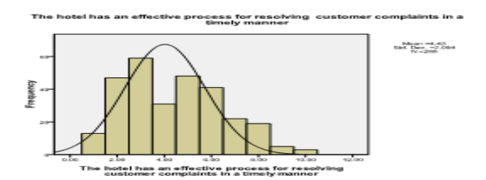
<tr><td>Variable 13</td><td></td><td>
</td><td>
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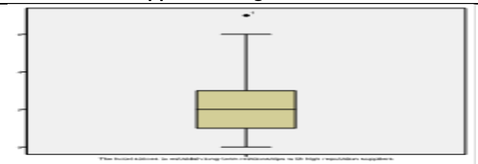
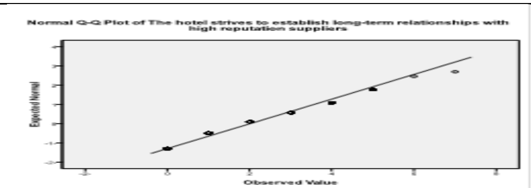
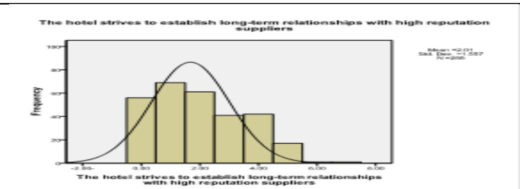
<tr><td>Variable 14</td><td></td><td>
</td><td>
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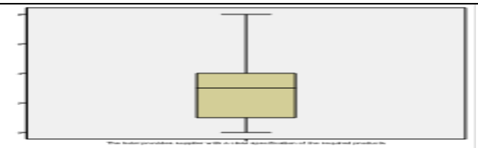
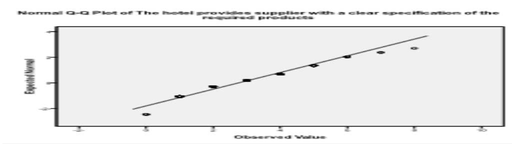
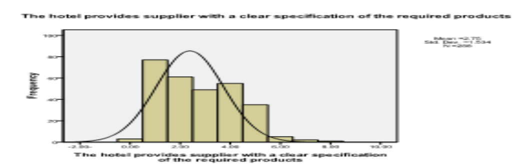
<tr><td>Variable 15</td><td></td><td>
</td><td>
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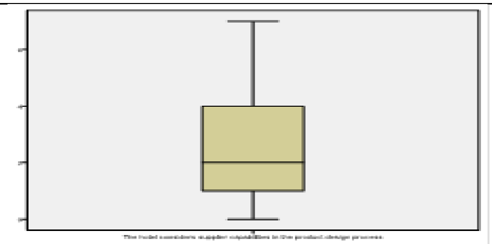
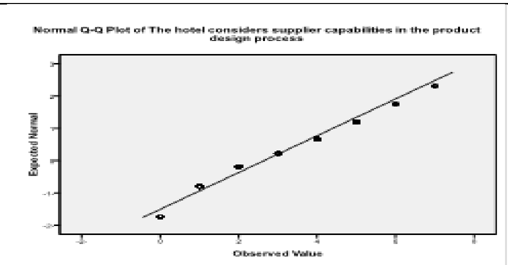
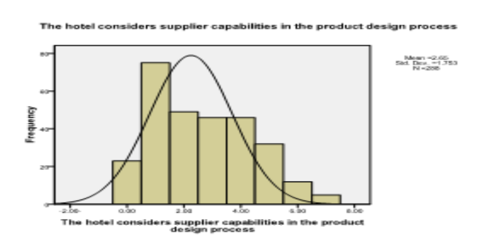
<tr><td>Variable 16</td><td></td><td>
</td><td>
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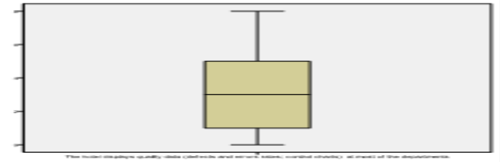
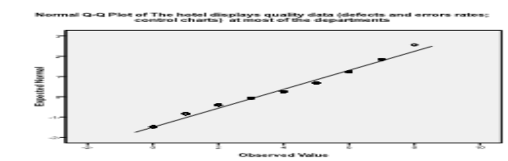
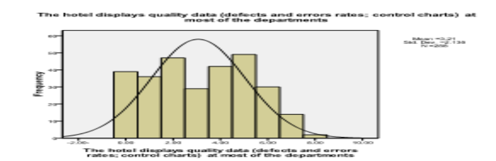
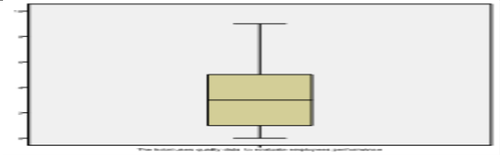
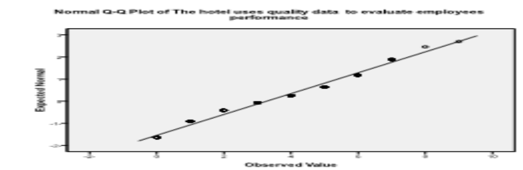
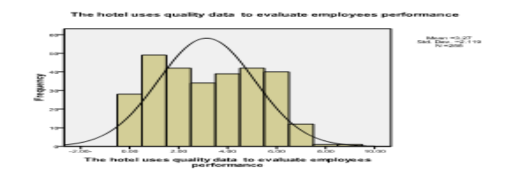
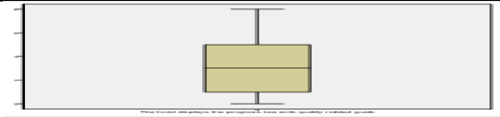
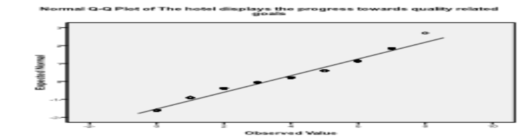
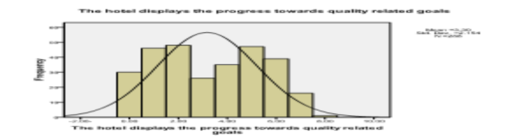
Variable 20			
Variable 21			
Variable 22			
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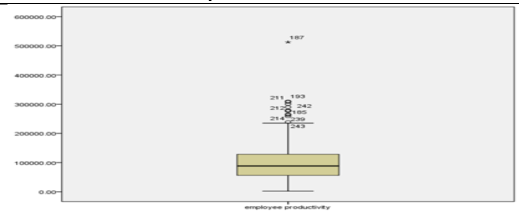
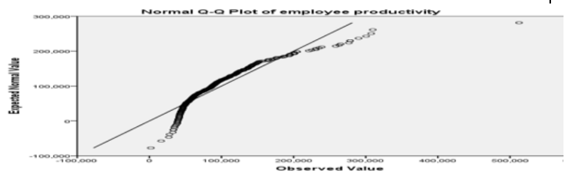
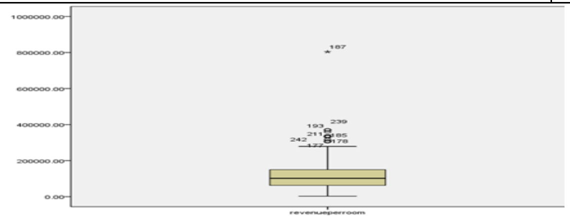
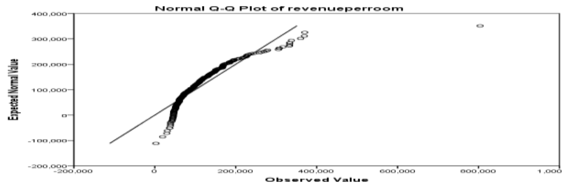
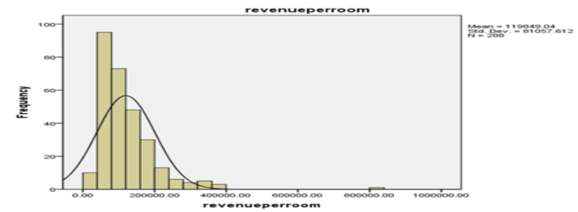
Variable 23			
Variable 24			

Appendix 10: A flowchart of ethical consideration for research in the Hull University business school